FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS.

Club Secretaries and others desirous of announcing the date of important fixtures are invited to send particulars for inclusion in the following list:

April 18 to May 2	Seaplane Competition at Monaco
April 21 ...	Lecture on "The Commercial Future of Airships," by Air-Commdr. Edward Maitland, C.M.G., D.S.O., A.F.C., at Royal Society of Arts, John Street, Adelphi, at 4.30 p.m.
May 22 and 23	Aviation Competition at Juvisy in connection with Fêtes de Paris
June 1 ...	Air Ministry Competition (Small Type Aeroplanes), Martlesham Heath
July ...	S.B.A.C. International Aero Exhibition at Olympia
July (mid.)	Seaplane Contests at Antwerp
Aug. 1 ...	Air Ministry Competition (Seaplanes), Felixstowe
Aug. (end of)	Schneider International Race, Venice.
Sept. 1 ...	Air Ministry Competition (Large Type Aeroplanes), Martlesham Heath
Sept. ...	International aviation week (with competitions) at Brescia, Italy
Sept. (end of)	Gordon-Bennett Aviation Cup, France.

EDITORIAL COMMENT

ALL who value the safety of flying will approve the action of the Air Ministry in enforcing the regulations relating to low flying over crowds in the case of the Grand National and the University Boat Race. At a time when civil aviation is struggling to keep its head above water, and to gain for itself the support of public opinion, it is more than ever desirable that no untoward occurrences of a preventible nature should hamper progress. No doubt the Air Ministry's warning was taken hardly by a few ambitious and daring pilots, akin to the youth who created such a scare on the day of the Australian march through London, but their disappointment is not to be measured against the safety and the nerves of the peaceful public. Flying such as we have referred to may be fun to the pilot, and may not even be dangerous in itself, but the effect on the general public is distinctly bad, and calculated to make the whole aviation movement unpopular. Low flying over large crowds, too, may easily cause a panic attended with serious consequences to large numbers of people who only want to be allowed to take their pleasures in their own way. One such panic, attended by loss of life and serious injury, as it most certainly might be, would do more to set back the wheels of progress than anything else imaginable. To our way of thinking, the Air Ministry would have failed in its duty had it waited for evidence of breach of the flying regulations before taking action against possible stunts. As it was, the authorities very properly took the course of issuing a serious warning in the first place, prohibiting flying over the course of the Boat Race at a lower altitude than 6,000 ft., while, in the case of the Grand National, a general warning was given not to fly over the course. We have thus been spared the exhibition which was made in 1914, when machines were flown low down over the Thames, to the terror of many and the good of none. We trust that the Ministry will take equally strong measures in all similar cases, and that any infraction of the regulations will be visited with stern penalties. Apart from the question of danger, low flying over such events as we

The Prevention of Dangerous Flying

are discussing is really a most unsportsmanlike practice, for reasons which are quite apparent to everyone, and, on that ground alone, should be taboo among all decent pilots.

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The Future of Civil Aviation

There are beginning to be signs manifested which tend to show that the Government is becoming a little nervous of its position in regard to civil aviation. It is not more than a week or two ago that Mr. Churchill appeared to cut the ground from under the idea that any support for the industry was to be looked for from the State. He told the country that "civil aviation must fly by itself." He then went on to say that the best thing the Government could do was to get out of the way, and the next thing was to smooth the way. He claimed that the first had been done, and that, before long, he would be able to tell the country all about the manner in which the way was being smoothed for civil flying. There was only one meaning to be attached to his speech. It was, on the face of it, an absolutely definite and apparently final banging and bolting of the door upon every idea of State support for an industry which is universally admitted to be vital to the future of country and Empire.

It cannot be said that Mr. Churchill's attitude was unexpected. No-one who has followed the trend of Government policy regarding aviation since the end of the War could have gathered, unless he were an incorrigible optimist, that the many promises of support held out from time to time were intended to be kept. The policy pursued has been one of constant neglect to fulfil promises and programmes, with the visible intent to gain time, while the industry died of sheer want of nourishment. Had the happy despatch eventuated as was obviously hoped, people would have partly forgotten that there was ever such an industry, and, in any case, the Government would have been freed from an embarrassment. We say, deliberately, that there is no other inference to be drawn from the facts than the one we have outlined above.

But many things have happened to falsify the Government's hopes. People have not been so ready to forget as officials believe. Nor have those who were most prominent in the industry during the War been content to retire upon the fruits of their labours in the time of stress. Strange as it may appear to the politician and the official, there are people who are so misguided in their ideas as to put the good of the nation before their own personal profit or ease. Patriotism is a plant which does not thrive too well under the blighting influence of politics or official administration, yet it is a hardy growth and refuses to be stifled, even under the conditions which have had to be met by civil aviation, and it is to the public spirit and patriotism of those in the industry that we mainly owe the change of heart which seems to be coming over the Government.

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The Process of Hedging

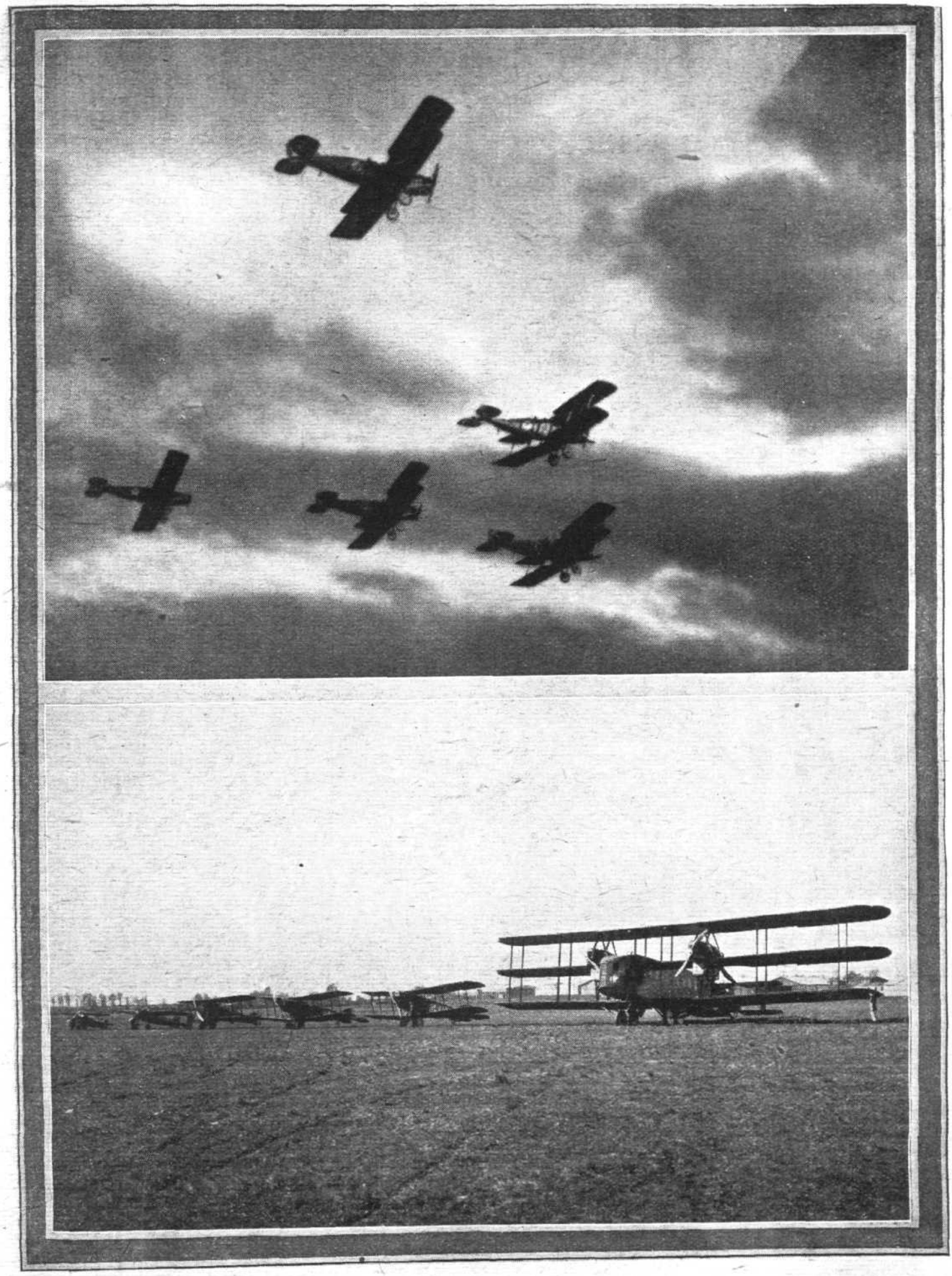
So powerful have been the influences at work since the War Minister callously laid down that civil aviation could expect nothing from the State that his henchmen have been compelled to hedge his statements. Major Tryon, who succeeded to the post resigned by General Seely, was constrained, the other day, to explain that what Mr. Churchill really meant was not what he said, but something much more elastic and possibly more welcome to those who view the present Government policy with alarm and misgiving. What the plural Secretary of State *did* mean was that civil aviation would *ultimately* have to sustain itself. It was not intended, he explained, to debar any Government action that might be necessary, after the report of the Advisory Committee had been received, to keep civil aviation going during the present difficult year following the War, until it could be built up again.

This is not much, but it may be one of those proverbial straws which show which way the wind sets. Either Mr. Churchill has been misunderstood or he failed to say precisely what he meant to say. Alternatively, he did mean what he said in the debate on the Air Estimates, but the Government mind has been changed in the interval. Of the three, we sincerely trust that it is the latter of the alternatives which is the correct solution. We are tired of platitudinous half-promises and speeches full of praise for the work of the industry during the War and good wishes for its future. What we want is to see some of the promises kept and to hear of a concrete policy which will make this country safe against aerial invasion and keep it in the lead so worthily established during the War.

Even if we take the Under-Secretary's statement at its face value, there still seems to be strong probability of long delays in the formulation of a real policy.

It will be noticed that he referred to possible Government action *after* the presentation of the report of the Advisory Committee. Why wait for that? The Air Ministry has its pigeon-holes full of reports and recommendations. Lord Weir's Committee foresaw with absolute prevision the state of things which has actually come to pass now, and made recommendations accordingly. The present Committee has been sitting for months, and has called in all the expert advice it could possibly need. It has made interim reports, and outlined a policy which would have gone far to save the industry if it had been adopted. What more in the way of reports and the views of expert committees can officialdom require to enable it to formulate a policy? Surely, the whole of the data are there to indicate to the meanest intellect that unless the recommendations of its own advisers are heeded by the Government, we shall have to start the development of aviation all over again. It does not require much sagacity to see that we are rapidly retrograding to where we were in 1914—that is, in the matter of actual use of aircraft. Then the aeroplane was regarded as an instrument of sport, with strong possibilities of usefulness in the carriage of mails and so forth. Experiments had been made with more or less success in the latter direction, and a few thought, in a detached sort of way, that there was a future for aircraft in transport. Still fewer saw farther ahead and realised the full possibilities. The Government looked askance at the aeroplane, and it was not so very many months before the War that the War Secretary was justifying inaction by saying that they were not completely convinced yet, and proposed to let others do the experimenting and to come in on the ultimate results. How much different is the position now?

How true it is that Governments learn nothing and forget nothing.



A flight of Bristols in the clouds, and below, the Bristol "family" at Home. *Left to right*: The Bristol Babe, the Bristol monoplane, the Bristol Badger, the Bristol Fighter, the Bristol Tourer and the Bristol Pullman triplane

The Present Position

Whether the Government intends to take action to save the industry from the slough into which it has fallen we shall see before long. A question which is of moment now is whether things have not been allowed to drift for so long that the work of recovery cannot be made effective in any period that will enable us to recover the ground we have lost in comparison with other countries whose rulers have seen the future with more prescience than our own. There can be no gainsaying the fact that aviation in this country has been allowed to fall into a very parlous state. We need not traverse all the facts again; they have been set forth in the pages of FLIGHT so many times.

Another question which has to be answered is of which is the best way to set to work on the process of rehabilitation. It is quite possible that some think that what the aviation industry asks is support for its factories and subsidies to swell its dividend funds. Nothing can be farther from the truth. Mr. Holt Thomas, whose recent resignation from the Aircraft Manufacturing Company has drawn widespread attention, has explained the position very lucidly in a letter to *The Times*. He puts it that the necessity for supporting aircraft *design* in the national interests is being mixed up with the question of supporting aircraft *factories*. The latter must support themselves to a large extent on other production or close down. but the cessation of *design*, in which this country was pre-eminent, would be a national disaster. The main point he makes, in which we thoroughly concur, is *the certain disintegration of the finest technical staffs in the world, if the present Government's policy continues.*

He then outlines his policy, supposing he were Air Minister. First, he would tell the Government that neither Army nor Navy could work without the Air and that he was determined to have a portion of their Estimates. He would convince them—perhaps—that any possible invasion of this country must inevitably be by air, and that neither Army nor Navy would be able to assist in the defence. He would say: "British design is supreme; a handful of designers only require to be supported, and I must have a million to spend on new type machines. I intend to order, in accordance with the size of the technical staff, a few machines at high prices. I am going, for instance, to possess, even in peace time, the fastest single-seater fighting scout in the world, and when I have got it, I am going to ask for a faster and better one. This will be the cheapest million out of the 200 odd millions you are going to spend on defence, and will keep us ahead of all countries and ready for emergencies. But it will not sustain sufficient pilots, mechanics, constructors, &c., and to meet this difficulty I propose a special Vote for Civil Aviation, which has proved itself of commercial value, but which cannot exist unassisted."

Here is a concrete constructive policy. It is simple, and by its very simplicity and its practical character promises a solution of the most pressing problems of the moment. Will the Government see it this way, or will there be further dilly-dallying and more promises of the pie-crust variety?

* * *

Applying the Civil Vote

Proceeding to the discussion of his proposed Vote for Civil Aviation, Mr. Holt Thomas quotes from the official notices of the Post Office, showing the time saved by the Paris air mail, and points out that the services to Paris and The Hague are absolute necessities to British commerce. Going further afield, a route from Cairo to Karachi would save eight days on the Indian mail. A surcharge of 3*d*. per letter would enable this line to be opened on a commercial basis, if all first-class mail matter were sent by air. These are figures which give one furiously to think. Mr. Holt Thomas should know whereof he speaks when it becomes a question of costing for aerial services and we can do nothing less than accept his figures as he gives them. Yet the Postmaster-General still plays at aerial post on the basis of a half-a-crown minimum for mail sent by these services!

Not the least trouble to be encountered is the ultra-conservatism of Government Departments. We have little doubt that the Post Office officials are as fully conversant with the facts and data as Mr. Holt Thomas himself. To think otherwise would be to underrate the intelligence of the individual. But realising all that a change in methods would mean to the public, and that it would assure the future of our aerial defence, these officials will not move until they are absolutely driven to it, because, for one thing, it is foreign to the departmental mind to accept avoidable responsibility, and for another that it would involve trouble and the disturbance of personal comfort. There is nothing the typical Civil Servant hates as much as being bustled out of the even groove of life into which years of habitual routine have fitted him. Change is abhorrent, no matter how great an advantage to the nation may be involved in an alteration of method. We really believe it is this which as much as anything is the cause of the apparent antipathy of the Post Office to taking up aerial carriage of mails with the seriousness it deserves. At present the Post Office is simply playing at it—and it will continue to do so until it is kicked up to the line. The position requires not only that all-round pressure should be brought to bear on the Government itself but that the business community should also keep hammering away at the Post Office for the extension of the aerial mail.

* * *

Aerial Navigators' Certificates

In a Notice to Airmen (No. 29) the Air Ministry lays down the conditions under which certificates of competency in aerial navigation are in future to be issued. There are five classes, from "Aerial Master Navigator" to "Aerial Navigator, Fourth Class." The examinations which have to be passed to obtain these certificates are closely allied to the syllabus of the Board of Trade examinations for masters and mates, with the necessary modifications to fit in with the different conditions obtaining in aerial navigation. They are, as they should be, fairly stiff, and the navigator who succeeds in obtaining the Air Ministry certificate need not fear having his qualifications called in question.

The chief interest to those not directly affected by the new regulations lies in the fact that they form another landmark in the history of aerial navigation. So far as we are aware, no other country has yet insisted upon the holding of certificates of competency of the kind, and these are thus the very first to be formulated. They supply yet another evidence, if such were needed, that aviation has attained to an equality as a means of travel with the older methods of travel by land and sea.

On another page of this issue of FLIGHT we print the text of the regulations and the synopsis of the tests which have to be passed by candidates.

FLIGHT

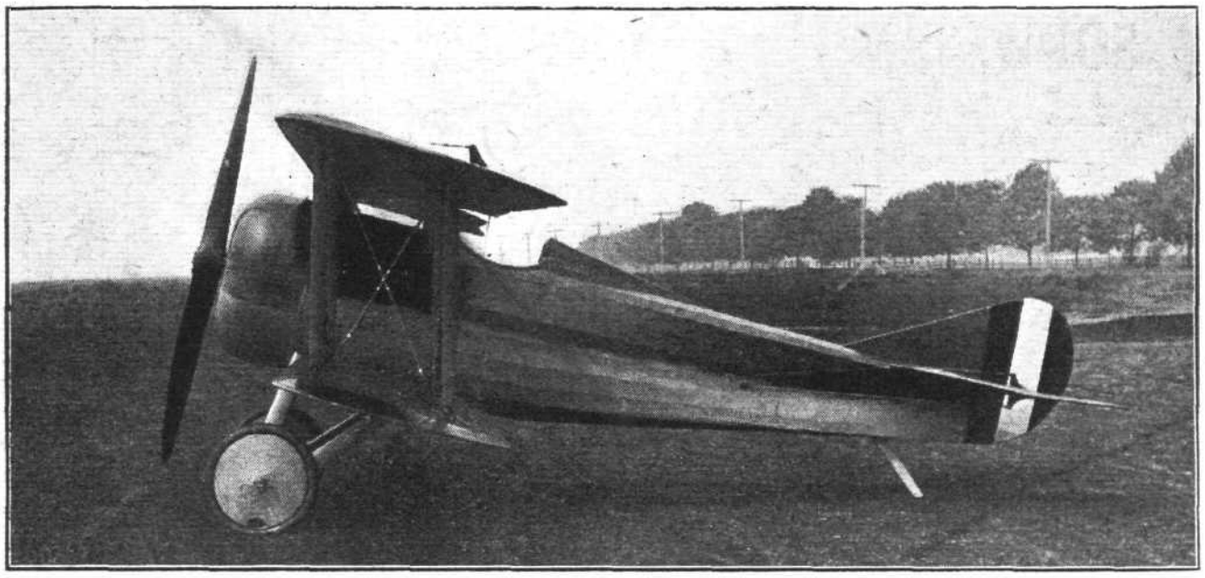
SOME "ORENCO" (U.S.A.) AEROPLANES

To designate the products of its aircraft department the Ordnance Engineering Corporation, who have been building military aeroplanes in the United States for more than three years, has adopted the name "Orenco."

During the War the designers of Orenco aeroplanes were constantly in close touch with the military authorities engaged in developing up-to-date training and fighting aircraft for the rapidly-increasing U.S. air service. The first Orenco plane, the Type "A," was a two-seater primary training tractor with dual control and side-by-side seating, and experience showed that students were trained in less time than when the tandem style of seating was used.

One of the fastest planes now in the U.S. Army Air Service is the Orenco Type "D" pursuit fighter, equipped with a 300 h.p. Hispano-Suiza engine. Near the ground the speed is 147 m.p.h., and the landing-speed 50 miles. The "D" machines contracted for by the Army were provided with twin-synchronised Browning machine guns neatly mounted above the engine and entirely enclosed by the cowling, and among the accessories were leakproof fuel tanks of the highest development. General specifications of the Type "D" pursuit fighter will be found in the table at the end of these notes.

As may be seen from the accompanying drawings and photographs of this machine, it differs in many respects from



Side view of the "Orenco" Type "B" pursuit single-seater fighter

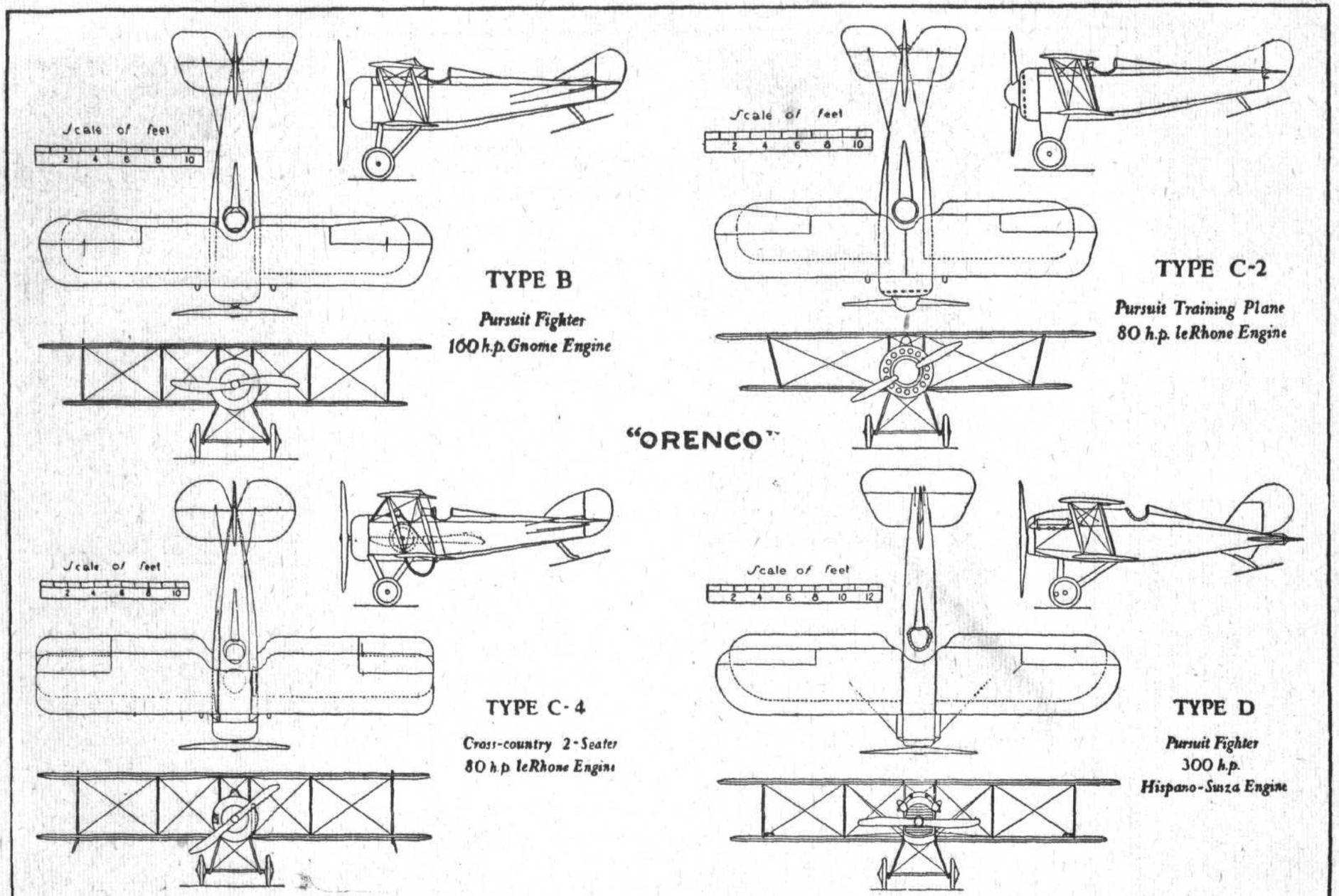
The Type "B" pursuit fighter, a fast plane designed to carry a novel arrangement of experimental machine guns, is one of the fastest planes of its kind. With a 160 h.p. Gnome engine, the speed is said to be 135 m.p.h., whilst the landing-speed is as low as 45 m.p.h. The general design is pleasing, the merging of the circular cross-section in front to the rectangular cross-section of the *fuselage* in the rear being very neatly carried out. The pilot, whose head is almost level with the top plane, has an exceptionally good range of vision.

The urgent need for advanced training planes led to the conversion of this plane to a training machine called the Type "C." This plane with an 80 h.p. Le Rhone engine was identical in all other respects to the Type "B"; its high speed was 102 m.p.h., and the landing-speed was only 40 m.p.h.

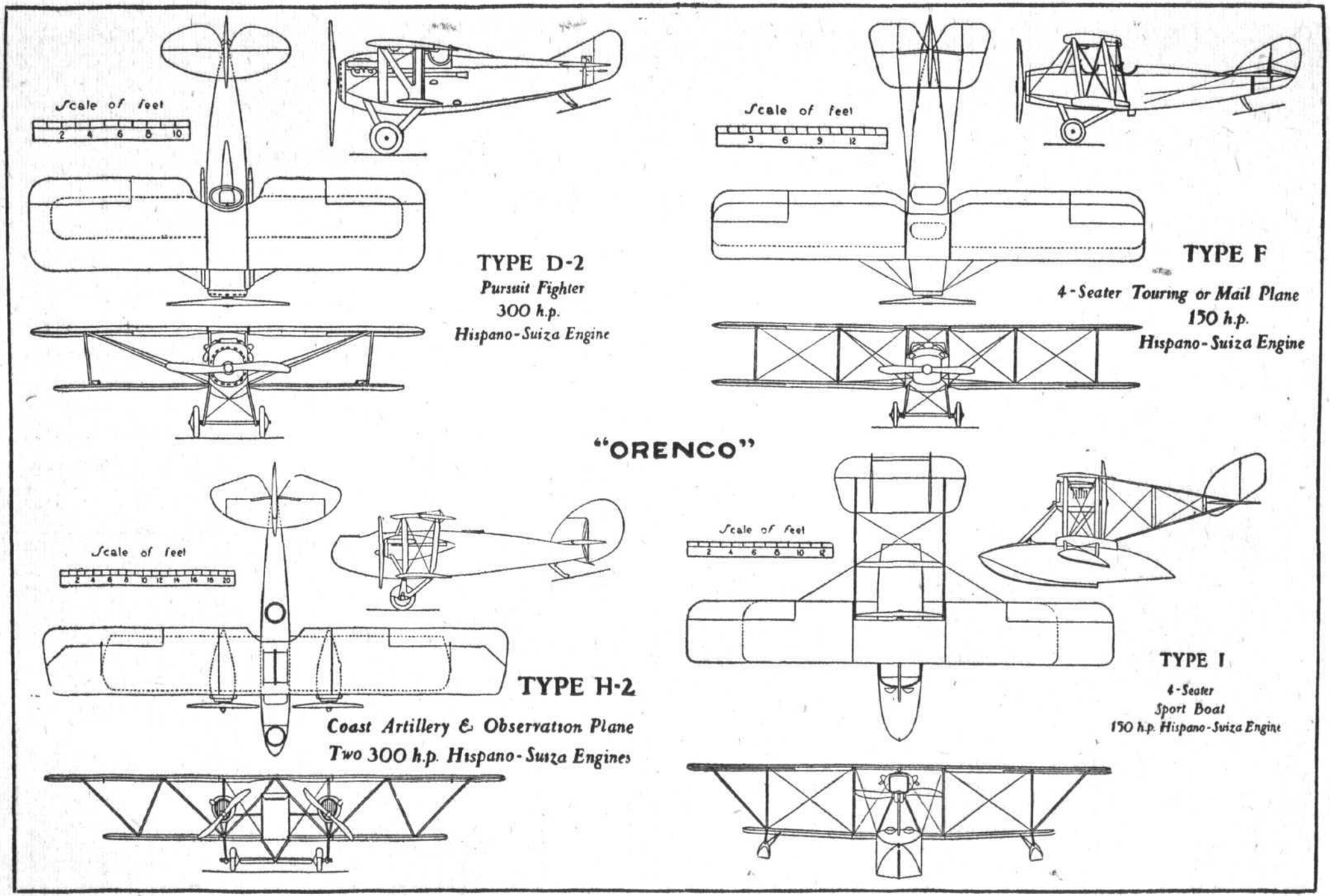
the Type "B" pursuit fighter, and in general appearance is a cross between the British S.E. 5 and the German Halberstadt C.V. The balanced rudder and fin are mounted above and forward of the tail plane, to which is hinged a one-piece elevator. *Ailerons* are fitted to the top plane only. Fuel weighing 330 lbs. gives an action radius equal to 275 miles at full speed. The climb to 5,000 ft. is accomplished in 4 mins. 20 secs.; to 15,000 ft., 16 mins. 45 secs. In landing, the machines comes to a complete rest after a run of about 250 ft.

A further development of the Type "D" design is the "D 2" pursuit fighter, designed to make a speed of 165 m.p.h. with a 300 h.p. Hispano-Suiza engine. The lower plane is very much smaller than the top plane, having less than half

Three-quarter front view of the "Orenco" Type "D" pursuit single-seater fighter



SOME "ORENCO" (U.S.A.) AEROPLANES : Plans, side and front elevations to scale



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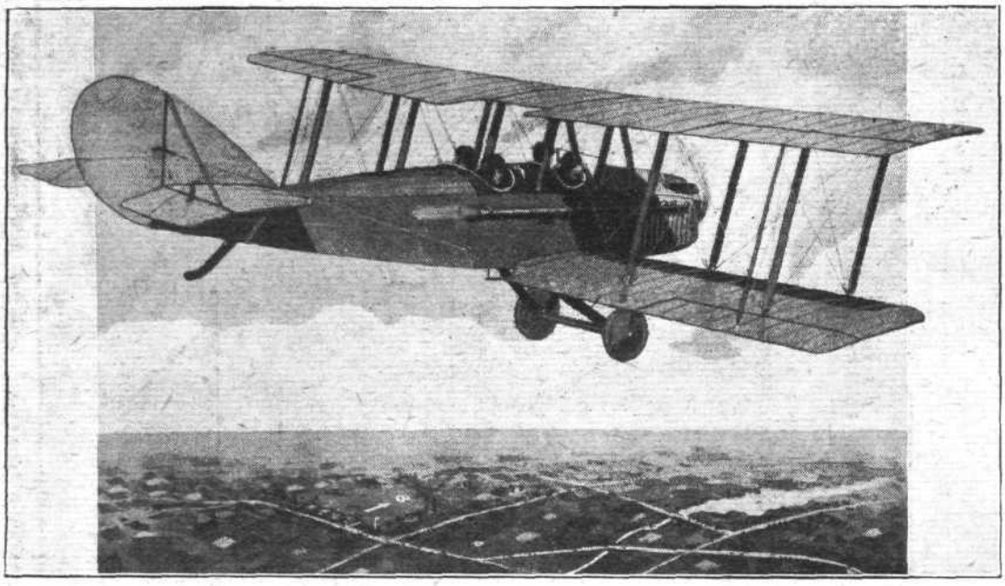


The "Orenco" Type "F" four-seater "commercial" biplane

the area. There is only one pair of V interplane struts on each side of the *fuselage*, and, instead of lift wires, streamline struts are employed. There are no anti-lift wires.

Other Orenco designs for military planes include the "C 2" advanced training plane; the "C 3" pursuit training plane; the "C 4" cross-country plane; the 400 h.p. Type "E" armoured fighter; the Type "E 2" infantry liaison plane, and the twin-motored (tractor) Type "H 2" artillery observation and fighting aeroplane. The latter has a deep rectangular *fuselage* with gun positions in the nose and at the rear of the main planes. The Warren type of interplane bracing is employed. The top plane, which is much larger than the lower plane, is built up in three sections, and the lower plane in four. The engines are carried in neat streamline housing midway between the top and bottom planes. All control surfaces are balanced.

At present the company is completing the first of its commercial planes, the Type "F" tourist provided with a 150 h.p. Hispano-Suiza engine. This plane can travel a distance of 290 miles at the rate of about 90 m.p.h., carrying the pilot and three passengers. The side-by-side seating arrangement is comfortable and convenient. Dual controls in the rear cockpit enable a passenger to handle the machine, the pilot being able to resume control at any instant. For carrying mail or light express the Type "F" may be slightly modified to meet the requirements of such special services.

For general passenger carrying and sporting uses, where lakes and rivers are available, there is the Type "1" four-seater flying-boat. A closed hood covers the passengers' and pilots' compartments, protecting them from wind and spray. It is of the "Bat Boat" class, having a short, single-stepped hull, and outriggers carrying the tail planes. The engine is mounted high up above the hull, and drives a pusher screw.

Dimensions of Orenco Aeroplanes

Type of Aeroplane.	Type.	No. of Seats.	Wing span.		Wing chord.		Wing area (including *ailerons*).			*Aileron* area.	Horizontal areas.		Vertical areas.		Length.	Height.	Gap.	Stagger.	Dihedral angle.		Incidence angle.	
			Upper.	Lower.	Upper.	Lower.	Upper.	Lower.	Total.		Stabiliser.	Elevator.	Fin.	Rudder.					Upper.	Lower.	Upper.	Lower.
			ft.	ft.	ft. in.	ft. in.	square feet.			sq. ft.	square feet.				ft. in.	ft. in.	in.	in.	°	°	°	°
Primary training	A	2	44	34	6 0	6 0	258	172	430	40	32·8	24·6	5·5	12	26 7	10 6	66	14	1·5	1·5	3	3
Pursuit fighter	B	1	26	23	4 0	3 9	102	78	180	17·9	12·2	13·3	2·35	5·4	18 10	7 4	44·5	12	—	—	2	1
Military training ..	C	1	26	23	4 0	3 9	102	78	180	17·9	12·2	13·3	2·35	5·4	18 10	7 4	44·5	7	—	—	2	1
Advanced training ..	C_2	1	26	23	4 0	3 9	102	78	180	17·9	12·2	13·3	2·35	5·4	18 10	7 4	44·5	13·5	—	—	2	1
Pursuit training	C_3	1	26	23	4 0	3 9	102	78	180	17·9	12·2	13·3	2·35	5·4	18 10	7 4	44·5	13·5	—	—	2	1
Cross-country	C_4	2	30	30	4 6	4 6	129	120	249	31·2	16·8	13·8	3·75	6·7	20 0	8 7	54	15	—	—	2	2
Pursuit fighter	D	1	30	28	5 0	5 0	142	119	261	27·6	15	17	4·8	7·9	21 6	8 3	52	12	—	—	2	1·5
Pursuit fighter	D_2	1	28	25	6 6	3 0	170	64	234	29	13·5	11·5	2·75	6	20 8	8 0	49	27	—	—	2·5	·5
Armoured fighter	E	2	45	45	6 6	6 6	291·2	265·8	557	92·8	36·8	27·2	6·2	13·6	28 7	10 2	72	—	—	—	3	3
Infantry liaison	E_2	2	46	46	7 0	7 0	306·2	293·8	600	74	26·8	35·6	4·5	15·2	30 7	11 10	78	22	1·5	1·5	3	3
Touring or mail	F/F_2	4	38	38	5 0	5 0	182	173	355	41·3	26·7	21·6	4·26	9·6	24 10	9 0	60	12	1·5	1·5	2	2
Artillery observation ..	H_2	3	56	42	8 0	6 7	432	248	680	68·5	33·3	34	11	32·2	36 0	13 0	84	5	—	—	5	3
Commercial	H_3	12	56	42	8 0	6 7	432	248	680	68·5	33·3	34	11	32·2	36 0	13 0	84	5	—	—	5	3
Sport boat	1	4	38	28	5 6	5 6	185	132	317	30	24	22	21	12	25 9	10 3	69	—	—	1·5	2	2

Specifications of Orenco Aeroplanes

Type of Aeroplane.	Type.	Engine.		Weight.			Run required.		Fuel capacity.	Range at full speed.	Speed.					Time of Climb.			Loading.	
		Make.	h.p.	Empty.	Loaded.	Useful load.	To take off.	To stop.			Landing.	At sea level.	At 5,000 feet.	At 10,000 feet.	At 15,000 feet.	To 5,000 feet.	To 10,000 feet.	To 15,000 feet.	Per sq. ft.	Per h.p.
				lbs.	lbs.	lbs.	ft.	ft.	lbs.	mls.	miles per hour.					m. s.	m. s.	m. s.	lbs.	lbs.
Primary training ..	A	Duesenberg	105	1,476	2,167	691	400	300	240	306	38	74	72	66	—	15 0	44 0	—	4·8	20·6
Pursuit fighter	B	Gnome ..	160	985	1,290	305	110	200	210	202	45	135	132	126	118	3 20	7 0	15 11	7·16	8·05
Military training ..	C	Le Rhone ..	80	835	1,117	282	145	150	98	200	40	102	96	90	81	6 50	18 0	40 0	6·2	13·95
Advanced training ..	C_2	Le Rhone ..	80	748	1,090	342	140	150	110	230	42	108	102	94	85	6 15	16 30	35 0	6·05	13·6
Pursuit training	C_3	Le Rhone ..	80	835	1,117	282	140	150	110	230	42	102	96	90	81	6 50	18 0	40 0	6·2	13·95
Cross-country	C_4	Le Rhone ..	80	985	1,570	585	300	300	110	214	38	95	93	88	—	14 15	41 0	—	6·3	19·6
Pursuit fighter	D	Hispano-Suiza	300	1,666	2,432	766	250	350	330	275	50	147	144	139	132	4 20	8 54	16 45	9·3	8·1
Pursuit fighter	D_2	Hispano-Suiza	300	1,345	2,256	911	225	400	353	330	55	165	162	158	151	4 0	8 30	13 50	9·64	7·52
Armoured fighter ..	E	Liberty ..	400	4,090	5,610	1,520	400	500	215	120	60	120	115	98	90	6 0	18 0	40 0	10·08	14·0
Infantry liaison ..	E_2	Liberty ..	400	3,428	5,046	1,618	350	450	675	406	50	130	126	120	112	6 0	14 0	29 0	8·5	12·6
Touring 4-seater ..	F	Hispano-Suiza	150	1,477	2,432	955	350	300	250	290	43	100	94	88	79	9 0	24 0	62 0	7·15	16·2
Artillery observation ..	H_2	2 Hispano-Suizas	600	3,362	5,832	2,470	275	350	1,140	450	48	140	133	128	117	3 30	8 30	17 0	8·56	9·2
Commercial	H_3	2 Hispano-Suizas	600	3,530	6,000	2,470	275	350	1,100	422	48	140	131	124	102	4 15	11 0	22 0	8·83	10·0
Sport boat	I	Hispano-Suiza	150	1,530	2,500	970	600	350	250	126	42	73	70	65	58	11 0	26 0	76 0	7·85	16·65

FLIGHT

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

SPECIAL COMMITTEE MEETING

A SPECIAL MEETING of The Committee was held on Wednesday, March 24, 1920, when there were present :—Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair, Mr. Ernest C. Bucknall, Mr. G. B. Cockburn, Lieut.-Col. F. K. McClean, Lieut.-Col. Alec Ogilvie, Mr. A. Mortimer Singer and the Secretary.

Election of Member.—The following New Member was elected :—

Capt. Alfred Mayer.

Temporary Honorary Membership.—Henri Francois Martin, (Secretary Swiss Legation in England).

Nominations to The Committee.—The Secretary reported that the following members had been nominated for election to the Committee for the year 1920 :—

Brig.-Gen. The Duke of Atholl, K.T., M.V.O., D.S.O.
Maj.-Gen Sir Sefton Brancker, K.C.B.
Mr. Ernest C. Bucknall.
Mr. G. B. Cockburn.
Col. F. Lindsay Lloyd, C.M.G., C.B.E.
Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P.
Lieut.-Col. Mervyn O'Gorman, C.B.
Group-Capt. C. R. Samson C.M.G., D.S.O., R.A.F.
Mr. A. Mortimer Singer.

The number of candidates nominated for election to the Committee not exceeding the number of vacancies, no ballot paper had been issued.

Vice-President and Council, 1920.—On the motion of Brig.-Gen. Sir Capel Holden, seconded by Mr. G. B. Cockburn, it was unanimously resolved :—

"THAT M. Andre Michelin, the President of the Aero Club de France, be invited to join the Council of the Club."

It was also decided to recommend to the Annual General Meeting on March 30, 1920 :—

1. The re-appointment of Lord Northcliffe as Vice-President.
2. The re-election of the present Council.

Flying Services Fund.—The report of the Meeting of the Flying Services Fund Committee held on March 15, 1920, was received and adopted.

The audited statement of receipts and expenditure of the Fund for the year ending December 31, 1919, was also adopted.

Aviators' Certificates.—The following Aviators' Certificates were granted :—

7857. George Edward Gordon Duff.
7858. John Lord Stuart Gill.
7859. Fred William Kurtz.

TECHNICAL AND COMPETITIONS COMMITTEE

A Meeting of the Technical and Competitions Committee was held on Wednesday, March 24, 1920, when there were present :—Lieut.-Col. F. K. McClean, in the Chair, Mr. Griffith Brewer, Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., Maj. R. H. Mayo, Lieut.-Col. Alec Ogilvie, Lieut.-Col. H. T. Tizard, Mr. Howard T. Wright and the Secretary.

Racing Machines.—Letter from the Air Ministry on the question of Certificates of Air-worthiness for Racing Machines was considered.

THE FLYING SERVICES FUND

(*Registered under the War Charities Act*, 1916)

Administered by the Royal Aero Club

For the benefit of *Officers, Non-Commissioned Officers and Men* of the ROYAL AIR FORCE who are incapacitated while on duty, and for the widows and dependants of those who are killed or die from injuries or illness contracted while on duty.

Subscriptions :	£	s.	d.
Total subscriptions received to March 23, 1920	16,998	17	7
Collected at Parade Services at various Royal Air Force Stations	13	12	7
Total, March 29, 1920	17,012	10	2

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary

WIRELESS DIRECTION FINDING FOR AEROPLANES

AN extremely important and interesting demonstration of wireless telephony used in conjunction with aircraft was given by the Marconi Co. last Thursday. Compared with the demonstration given about a year ago—described in FLIGHT for June 5—last Thursday's accomplishments were of a far more practical nature, and proved beyond doubt that wireless telegraphy and telephony form an essential part of aviation. It was originally intended that the Handley Page machine taking part in the demonstration was to fly over the London-Brussels route, but as this service was temporarily suspended a "local" circular route was made instead. In this connection it should be recorded that the wireless stations in use were suitably located for the London-Brussels route, and were not, as it happened, so well placed for the route actually taken, rendering it much more difficult to obtain accurate readings. In spite of this, however, the results obtained were highly satisfactory.

Briefly the demonstration consisted in locating the position of the Handley Page machine, at intervals, during its flight by means of the Marconi wireless direction finding (D.F.) apparatus. How this is actually accomplished must be told on another occasion—it being a subject requiring explanation of many technicalities to be fully understood—but it may be briefly explained as follows :—Each of the three wireless stations, located at Pevensey, Lowestoft and Chelmsford, kept in telephonic communication with the aeroplane, and by means of their respective D.F. instruments obtained the bearings, or direction, of the messages received. It will be seen that if each station knows the direction from which the aeroplane's message comes, it is only necessary for the central station—in this case Chelmsford—having obtained the bearings from the other stations, to draw on a map a straight line from each station corresponding to the given bearings, and the lines will intersect at the actual position of the aeroplane.

Apart from the direction finding side of the proceedings, the demonstration also proved the enormous value and possibilities of the wireless telephone alone in connection with aircraft. Not only were we, at Chelmsford, in constant communication with those on board the Handley Page, but several messages from the latter were taken down and immediately transmitted to various offices in London. The next step, "connecting up" from the wireless direct to the ordinary "land" telephone (*i.e.*, to any subscriber whose number is to be found in the telephone directory) is, we understand, just emerging from the experimental stage.

The Handley Page taking part in this demonstration, left Cricklewood, piloted by Maj. E. L. Foot, M.C., R.A.F., with a party of Press representatives on board, at about 2.30 p.m. Weather conditions were not absolutely ideal, a gusty 40-50 m.p.h. wind blowing. The first message from the machine was received immediately after it left the aerodrome, and then at intervals the bearings of the machine were taken, and its course traced on the chart. Perhaps the strangest incident of these proceedings was the holding of a conversation whilst the machine itself was passing over the station! The last message received was to the effect that the machine was planing down into Hendon aerodrome, and was just about to land.

Prior to the demonstration, thanks to the courtesy of the Marconi Co., a tour of inspection was made of the magnificent works, at Chelmsford, and on the evening previous there was shown a film just produced by Jury's, in which the "story" of wireless telephony and direction finding in connection with the London-Brussels air service was graphically told.

FLIGHT

APRIL 1, 1920

AIRBRAKES AND THE SIDESLIP LANDING

BY LIEUT. F. T. COURTNEY, late R.A.F.

ONE of the first problems in commercial aviation awaiting solution is that of providing a low landing-speed. During the War, in order to obtain a high maximum performance, aeroplanes were designed with high wing loadings, resulting in landing-speeds so high that pre-War pilots would have deemed them impossible except for racing machines which were only required to alight on specially prepared aerodromes. Pilots put up with these high landing-speeds, partly because, if all went well, there were suitable landing-grounds where an ordinarily skilled pilot could alight with reasonable safety, and partly because the risk of high landing-speed was insignificant compared with the War risk of inferior performance resulting from fitting such larger wings as would have reduced the landing-speed. For commercial aviation, however, when in the very nature of things landings may have to be made in very restricted and otherwise unsuitable areas, landing-speeds will have to come down. To realise this with the ordinary fixed wing machine necessarily means a depreciated performance, and many are of the opinion that retaining the high wing loading, but employing in conjunction with it some form of air-brake, offers the solution of the problem.

Lieut. Courtney, who is now chief test pilot on the Airco experimental staff, in the following article gives his views of the subject, and advocates the sideslip landing as a most effective air brake. As Lieut. Courtney has had very extensive experience in all sorts of test flying, and is at present engaged on experiments with sideslip landings, his opinion naturally carries weight. His main point is, we think, that when landing a pilot has his hands so full that it is impossible for him to attend to any more "gadgets," no matter how simple. Secondly, he maintains that the sideslip landing is easy, and can be made by any pilot and on practically any machine. We should welcome the views of designers and of other pilots who, during the War, have had experience of the sideslip landing, on this subject. That this form of landing is effective is amply proved by the accompanying diagram of a series of landing-tests carried out by the Airco experimental department. It appears to us, however, that it may not be without its risks, especially on a gusty day when, it would appear, there is only a very narrow margin between the sideslip landing and stalling. It is for this reason that we invite practical pilots and designers to give their opinion on a subject which is of no small moment to commercial aviation.—ED.

As aeroplanes get faster and faster the landing question becomes more difficult, and amongst other things the question of airbrakes assumes great importance.

Now, for some reason which is not at all obvious, the sideslip form of landing is officially forbidden for commercial purposes. The only reason one can imagine for this is that the sideslip landing is a "stunt." And the object of these remarks is to try and show that this landing is not a stunt, is not difficult or dangerous, and is the simplest form of employing an airbrake that has been or is likely to be devised.

First of all, I think that the airbrake has two definite and distinct uses: (1) As an arrangement whereby the gliding angle of a machine may be made so steep, that in a great emergency, when the pilot has no other object than to reach the ground in the least possible time (fire, faintness, serious damage, etc.), he may turn on his airbrake and descend steeply without diving; (2) As an arrangement whereby, when landing under ordinary conditions, he may so regulate his gliding angle, when clearing obstacles or otherwise, that he may make the best possible use of the landing space available.

For use (1) an apparatus quite distinct from the ordinary controls would be perfectly practicable. One can easily imagine how, in the future, such a device would be of the greatest use. Indeed, apart from its emergency use, it might be used to obviate the monotony of gliding from a height.

But for use (2) things become quite different. One need not be a pilot to realise that, when landing, especially when landing a fast machine in a small space, the pilot's miserable allowance of two hands is fully occupied with his joystick and throttle. Even the tail adjustment, for the last few dozen feet, must be left to look after itself, if the pilot has up to then forgotten to look after it. So that, for purposes of regulating and varying the gliding angle, another control, however simple, simply *cannot* be attended to.

Yet when trees have to be cleared, and the aerodrome is small, or when the machine has a high landing-speed, this gliding angle has to be regulated. And it requires no particular gift of foresight to see that conditions of this difficulty are going to be common affairs in future commercial aviation.

Supposing you have a small field to get into, and there are trees to cross first, what are your requirements? Firstly, that you should be able to clear those trees by the minimum distance at the minimum gliding speed, and that then you should be able to glide steeply after passing the obstacle. Now, no airbrake that has so far been, or to my mind ever will be, invented will have the combined rapidity and range of adjustment necessary for these requirements, even if it could be used when it was invented.

(I am leaving out of account the idea of gliding a little short, and then putting on the engine to clear the trees. Twice on one fairly cold day, on a well known commercial engine, my throttle has frozen and refused to open at the critical moment, and various forms of this difficulty are always arising and always will.)

Now the sideslip landing is a method whereby, by the use of the ordinary controls, the side surface of the fuselage is made to serve as an airbrake, an airbrake which is tremendously efficient, has a wide range through which it is moved with the greatest ease, is exceptionally well under control, combines with the functions of the other controls, and gives the pilot nothing extra to look after.

It is *not*, when used in the ordinary way, a stunt, although like most other things in life it can be made one. Suppose I am going into my tree-surrounded field by the sideslip method. I glide until, when heading for my field, I am *quite* certain of overshooting. Owing to wind, etc., it is, of course, quite impossible to estimate the exact gliding distance. As I approach the trees I can get a better idea of how much I have to spare in height, so I put on my (sideslip) airbrake. Watching the approach of the trees, I am able to judge better

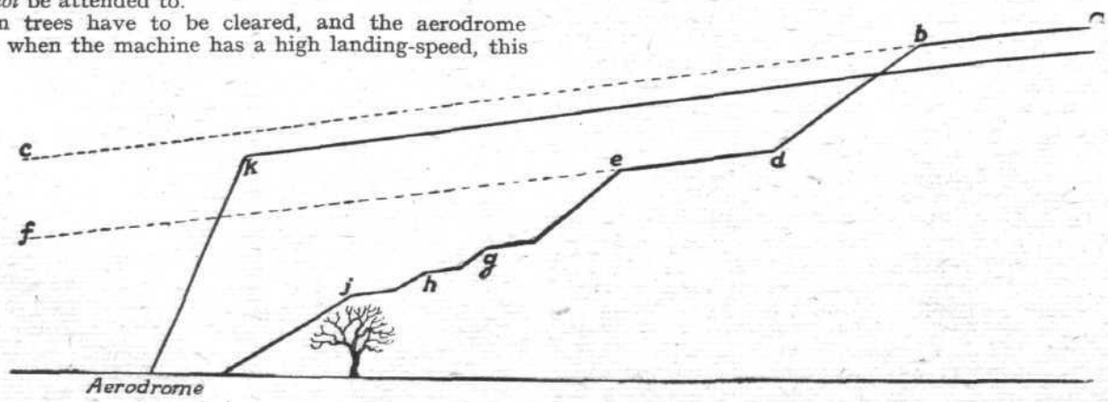


ILLUSTRATION OF A USEFUL SIDESLIP LANDING: Pilot heads at (*a*) for aerodrome, knowing for certain he will overshoot. At (*b*) he sees that if he goes on he will certainly arrive about (*c*), so he sideslips gently to (*d*), where he knows he still has room to spare. At (*e*) he realises that he will reach (*f*), so he sideslips again, and so on at (*g*) and (*h*), until finally he sideslips at (*j*) and lands. If the machine is properly controllable he can maintain a constant speed. For instance, the line (*ac*) represents the normal glide of the machine, and the line (*bd*) the gliding angle when the resistance of the *fuselage* side surface comes into play. If the pilot wants to do a "stunt" sideslip landing, he merely has to glide anywhere over the tree, and at (*k*) do a violent sideslip to the ground

and better how much I have to spare. Keeping my same forward speed, my minimum gliding speed, I drop off this height by means of my sideslip airbrake, increasing, varying, and taking it off as my view of the trees demands. When I cross the trees, I put on my airbrake again, and take it off just before I land. It is easy, is well within the range of any pilot's skill, is of no more inconvenience to passengers than turning the corner in a car, and is not, O Air Ministry, a stunt.

A further advantage, from the commercial aerodrome point of view, is that a machine coming in behind to land is not put out by the turns and twists of the machine in front of it.

"Yes," says someone, "that is all right for a school Avro, but you cannot do that with a heavy commercial machine." And that is why I hope designers may read this. The only thing required of *any* machine in order that it shall be already fitted with this simple and very valuable airbrake is that it shall be very *controllable at low speeds*. This *can* be done with *any* machine, and even, so far as my experience of machines goes, with very little alteration.

And perhaps the Air Ministry will one day remove the ban on sideslip landings, so that commercial firms will not have to spend all their money on land for large aerodromes.

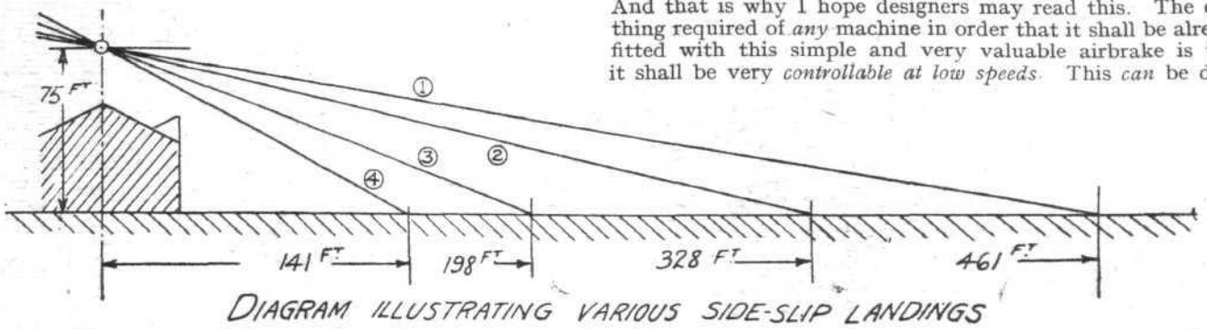


DIAGRAM ILLUSTRATING VARIOUS SIDE-SLIP LANDINGS

Above is the scale diagram of a test made by the Airco experimental department of various sideslip landings compared with an ordinary glide

Each glide was made over a space of 2,000 ft., and a constant forward speed of 70 m.p.h. was maintained in each case. The diagram shows how these various angles affect landing distances. No. 1 was an ordinary glide. No. 2 was a very gentle sideslip of 8°. No. 3 was a slightly steeper sideslip of about 13°. No. 4 was steeper still. The machine employed was not one which was particularly suited to sideslipping, yet the airbrake effect of the sideslip is greatly evident. Even the steepest sideslip was not enough to be inconvenient to the passenger

▣ ▣

London to Paris Air Route

THE Air Ministry has issued the following Notice to Airmen (No. 28) :—

"It is notified for information that the following arrangements have been made at the aerodromes at St. Inglevert, and Le Bourget on the London–Paris aerial route, and at Bordeaux :—

"*St. Inglevert* (approximately E. by N. 7 miles from Cape Grisnez).—A wind indicator is placed on the S.E. boundary of the aerodrome. The four corners of the area most suitable for landing are marked by set-squares in chalk. The centre of the landing-ground is marked by a white circle 132 ft. in diameter.

"*Le Bourget* (7 miles N.E. of Paris). *Night Landing.*—The aerodrome is lighted by a battery of searchlights, which illuminate a landing run of about 800 yards.

"*Bordeaux* (*Teynac Aerodrome about 2 miles west of Bordeaux*). *Night landing arrangements.*—(1) Two white lights 300 yards apart are placed on the leeward part of the aerodrome and marking the leeward boundary of the landing and taking-off area. A third white light is placed on the windward boundary, making with the two leeward lights an isosceles triangle; a machine landing must pass over the two leeward lights, heading towards the windward light. When there is no wind, the triangle of lights is placed in the position most favourable for machines landing.

"(2) White lamps are placed on obstacles as follows :—Two on each Bessonneau hangar, one on each garage.

"*Day Landing.*—A wind vane is placed between the two Bessonneaux hangars. A landing 'T' is placed according to the direction of the wind; when there is no wind, the 'T' is placed in the position most favourable for machines landing."

Hounslow and Croydon Lighthouses

THE Air Ministry has issued the following Notice to Airmen (No. 30) :—

"The flashing aerial lighthouse at Hounslow Aerodrome will cease operating from Thursday, March 25, in view of the closing down of that aerodrome within a few days.

"An aerial lighthouse has been established at Croydon Aerodrome, and will commence operating on Monday, March 28. This lighthouse will give three quick flashes every ten seconds, and will function every evening from half an hour after sunset until three hours after sunset."

Flying at the Grand National

THE Air Ministry issued the following Notice to Airmen (No. 31) on March 25 :—

"In view of the large crowds which are expected to attend the race meeting at Aintree, Lancashire, and especially on March 26 during the running of the Grand National, the attention of pilots is drawn to Clause 5, Section (2) (*b*) and (*c* (General Safety Provisions) of the Air Navigation Regulations, 1919, which prohibit the carrying out of any trick or exhibition flying over any race meeting, or the carrying out of any flying which, by reason of low altitude or proximity to persons or dwellings, is dangerous to the public safety.

"In order to prevent any interference with the racing, and also any accidents to the public, pilots should avoid flying either over or near the race-course.

"Any infringement of the Regulations will be dealt with rigorously."

Flying at the University Boat-Race

THE Air Ministry issued the following Notice to Airmen (No. 32) on March 25 :—

"The Secretary of State for Air has, in the interests of the public, issued an Order under the Air Navigation Acts, 1911-1919, prohibiting the navigation of aircraft of every class and description at a lower altitude than 6,000 ft. over the area within a radius of two statute miles of Hammersmith Bridge in the County of London, during the period from 12 o'clock midnight, March 26-27, to 12 o'clock midnight, March 27-28, 1920.

"Owing to the abnormal crowds which, it is anticipated, will collect in the above area on the 27th instant to witness the Inter-University Boat-Race, the Inter-University Sports and the F.A. Cup-tie, this precaution has been taken to obviate the possibility of accidents to the public, such as might occur owing to the sudden movement of masses of people occasioned by the flight of aircraft overhead.

"Any infringement of this Order will be dealt with rigorously."

Flights to Italy

THE Air Ministry has issued the following Notice to Airmen (No. 33) :—

"Owing to the difficulties with regard to personnel and other reasons, a request has been received from the Italian authorities that they may in every case be warned of the approximate times of arrival of British machines at Italian aerodromes, in order that the necessary assistance may be forthcoming.

"Pilots, therefore, intending to fly to Italy should in every case inform the Secretary (C.G.C.A.) Air Ministry, at the same time giving a schedule of their proposed journey. Once out of England, and particularly if it is found necessary to alter the original schedule, communication must be maintained with the British Naval Attaché, Rome, who will make what arrangements are possible with the Italian authorities. All machines intending to alight on aerodromes in Italian territory should circle three or four times round the aerodrome before landing."

NEW YORK AERO SHOW

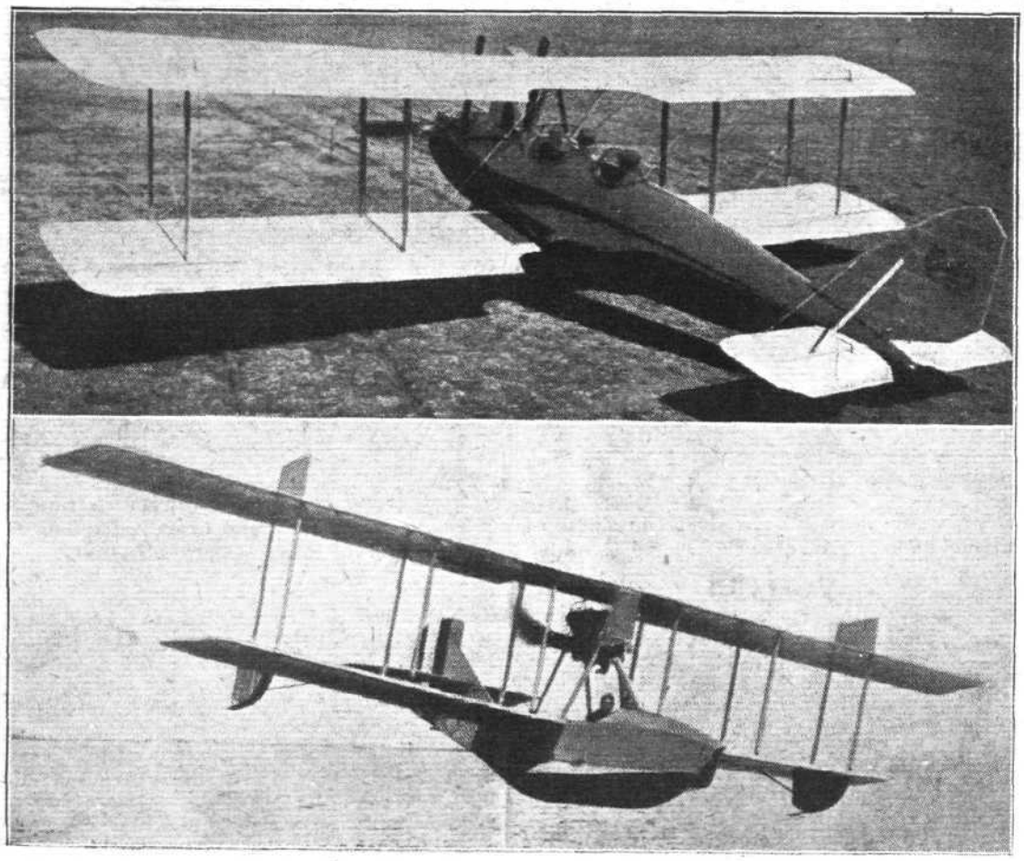
Last week we described and illustrated the Aeromarine exhibit at the New York Aero Show, which was held at the 71st Regiment Armory from March 6 to 13 last, and this week some particulars are given of other machines exhibited.

Curtiss Aeroplane and Motor Corp.—Five machines were exhibited by this firm as follows:—The "Eagle" 10-seater, twin-engined commercial plane; the "Oriole" three-seater biplane; the JN-4D tractor biplane; the Standard J-1 two-seater biplane; and the "Seagull" flying-boat. The "Eagle" is similar to the machine described and illustrated in Flight for January 8 and February 19, but differs in having two Curtiss 400 h.p. C 12 engines instead of three K 6, and a larger seating capacity. Its appointments are even more elaborate, and provision has been made for a large luggage compartment, a lavatory, and every other essential for long-distance flying. The principal characteristics of the "Eagle" are as follows:—

Overall span	64 ft. 4 ins.
Overall length	36 ft. 7¼ ins.
Overall height	12 ft. 11 ins.
Weight, empty	5,310 lbs.
Weight, full load	8,890 lbs.
Fuel	1,600 lbs.
Oil	180 lbs.
Speed, maximum, horizontal flight	124·5 m.p.h.
Speed, minimum, horizontal flight	56·2 m.p.h.
Maximum range	750 miles.
Motors (two)	C 12, 400 h.p. each

The "Oriole" is one of the stock machines which the Curtiss Co. is now producing in large numbers. It is a three-seater tractor biplane with a streamline *monocoque fuselage* of laminated-wood type. The cockpits are comfortably upholstered and provided with a side-door entrance. It is fitted with dual control, the stick and rudder-bar in the passenger compartment being removable. Specifications for the "Oriole" are:—

Overall span	36 ft.
Overall length	25 ft.
Overall height	9 ft.
Gross weight	2,354 lbs.
Useful load	790 lbs.
Fuel capacity	45·5 galls.
Maximum speed	96 m.p.h.
Minimum speed	51 m.p.h.
Climb	3,700 ft. in 10 mins.
Range of flight	440 miles.
Motor	Curtiss K 6 150 h.p.



At the New York Aero Show: The Curtiss "Oriole" three-seater biplane (top), and the "Seagull" flying boat (bottom).

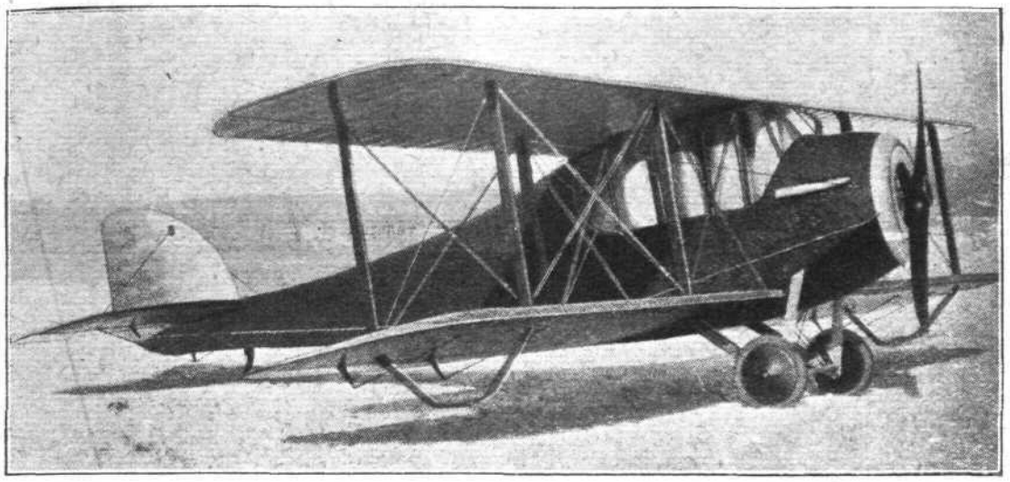
The J N-4 D is of the tractor biplane type, so well-known that a detailed description is hardly necessary now, it being similar to the JN's used in large numbers during the War, not only in America and Canada, but in this country and France, as training machines. The Standard J-1 is on similar lines to the JN-4 D, being a two-seater tractor biplane. This machine has been used extensively in commercial aviation "over there," 1,100 having been purchased. The specifications of this machine and the JN-4 D are as under:—

	J-1	JN-4 D.
Overall span	43 ft. 10 9/16 ins.	43 ft. 7⅜ ins.
Overall length	26 ft. 7 ins.	27 ft. 4 ins.
Overall height	10 ft. 10⅜ ins.	9 ft. 10⅜ ins.
Gross weight	2.025 lbs.	2.025 lbs.
Crew	1	1
Passengers	1	1
Fuel	31 galls.	21 galls.
Maximum speed	68 m.p.h.	75 m.p.h.
Minimum speed	37 m.p.h.	45 m.p.h.
Climb	2,600 ft. in 10 mins.	
Range of flight	235 miles	150 miles
Motor	Curtiss Model OX-5, 90 h.p.	8-cyl., V-type,

The "Seagull" is also a stock machine, and is similar to many that have been and are still doing good service in various parts of the States and elsewhere. Comfort and accessibility is provided in the seating arrangement. The forward, pilot's, seat is well clear of the passengers' seats immediately behind, giving plenty of leg-room. The hull is of ash, keel and *longerons* with spruce trussing and steel reinforcement. The bottom and side planking is of mahogany veneer, and the hull is finished in natural mahogany above the water-line and in marine green on the bottom.

Overall span	49 ft. 9⅜ ins.
Overall length	28 ft. 10 5/16 ins.
Overall height	11 ft. 9 7/16 ins.
Gross weight	2,726 lbs.
Petrol tank capacity	43 galls.
Maximum speed	76·5 m.p.h.
Minimum speed	48·5 m.p.h.
Climb	3,000 ft. in 10 min.
Range	28 miles.
Horse-power	150.
Motor	Curtiss K-6.

FLIGHT



At the New York Aero Show: The Dayton-Wright O-W Aerial Sedan.

Dayton-Wright.—This company showed the K-T Cabin Cruiser and the O-W Aerial Coupé, both enclosed passenger machines. The K-T model bears a strong resemblance to the D.H. plus a built-up cabin. It is purely a commercial machine, intended for either passenger or freight carrying, the passenger seats being removable. Two passengers are carried in addition to the pilot, all three being enclosed by a well-windowed cabin giving a good range of vision. A Liberty twelve 420 h.p. engine is installed. The O-W coupé, or Sedan, is also a three-seater machine, and is very luxuriously fitted up. The cabin is roomy and provided with large unbreakable glass windows, giving good visibility. It is stated that the enclosed cabin considerably deadens the noise of the engine, enabling conversation to be carried on in a normal tone of voice. The engine is a 180 h.p. model E. Hispano-Suiza, mounted in the nose of the *fuselage* behind a circular radiator.

The specifications of these two machines are :—

	K-T	O-W
Overall span	43 ft. 7½ ins.	46 ft.
Overall length	30 ft. 1 9/16 ins.	28 ft. 9 ins.
Overall height	11 ft. 2½ ins.	9 ft.
Chord	5 ft. 6 ins.	6 ft. 6 ins.
Stagger	11¾ ins.	—
Wing section	R.A.F. 15	R.A.F. 15
Area of main planes ..	441 sq. ft.	534 sq. ft.
Gross weight	4,128 lbs.	2,492 lbs.
Useful load	1,442 lbs.	1,042 lbs.
Loading/h.p.	9·82 lbs.	13·85 lbs.
Loading/sq. ft.	9·3 lbs.	4·66 lbs.
Maximum speed ..	120 m.p.h.	95 m.p.h.
Minimum speed ..	55 m.p.h.	35 m.p.h.
Range (cruising) ..	6 hours	10 hours
Fuel capacity	128 gallons	70 gallons
Oil capacity	13½ gallons	7 gallons
Engine	Liberty 12, 420 h.p.	His.-Suiza E.180 h.p.

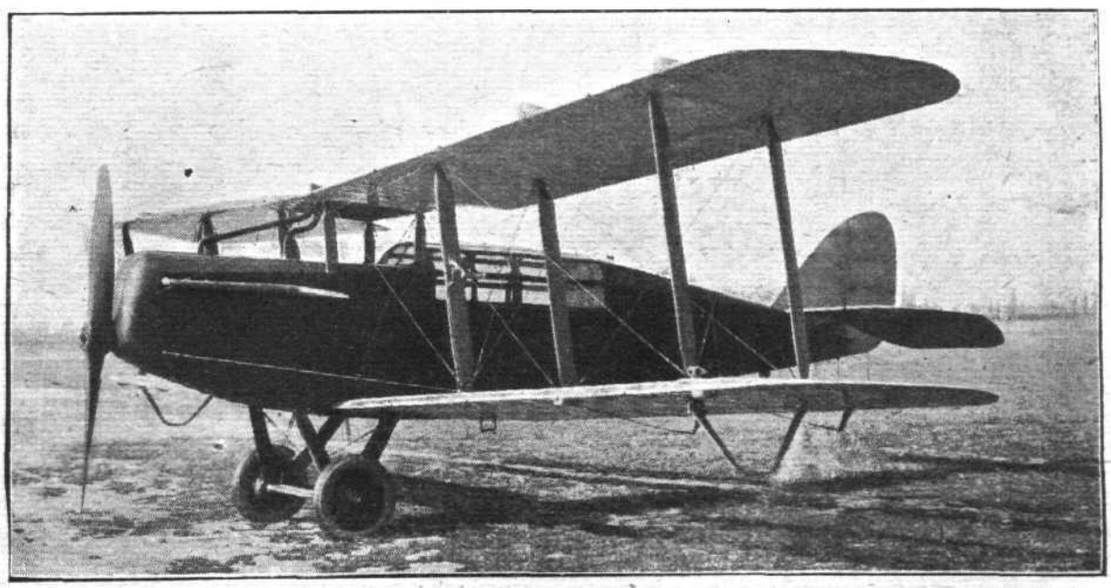
Horace Kean Aeroplane Co.—The new K-1 single-seater "Ace" sportplane was exhibited by this firm. This little machine has been designed to meet the ever-increasing demand for the low-priced, simple and safe "fly-about." It has ample strength, and the low landing-speed, good climb and high speed, together with its small dimensions and folding wings, are all features to this end. A simple 4-cylinder water-cooled "Ace" engine is installed, the cowling being so designed that by removing a couple of pins the whole of the engine is readily accessible. A honeycomb radiator is mounted in the nose of the *fuselage*, in front of the engine, Upper and lower planes are separated by one single interplane strut on each side. The principle specifications are as follows :—

Overall span	25 ft.
Overall span (folded)	9 ft.
Overall length	19 ft. 6 ins.
Overall height	8 ft.
Wing section	R.A.F. 15
Area of main planes	185 sq. ft.
Gross weight	832 lbs.
Loading/h.p.	20·6 lbs.
Loading/sq. ft.	4·5 lbs.
Maximum speed	80 m.p.h.
Minimum speed	30 m.p.h.

L.W.F. Engineering Co.—The two machines exhibited by the L.W.F. Co. were very antipodean, and were appropriately named the "Owl" and the "Butterfly."

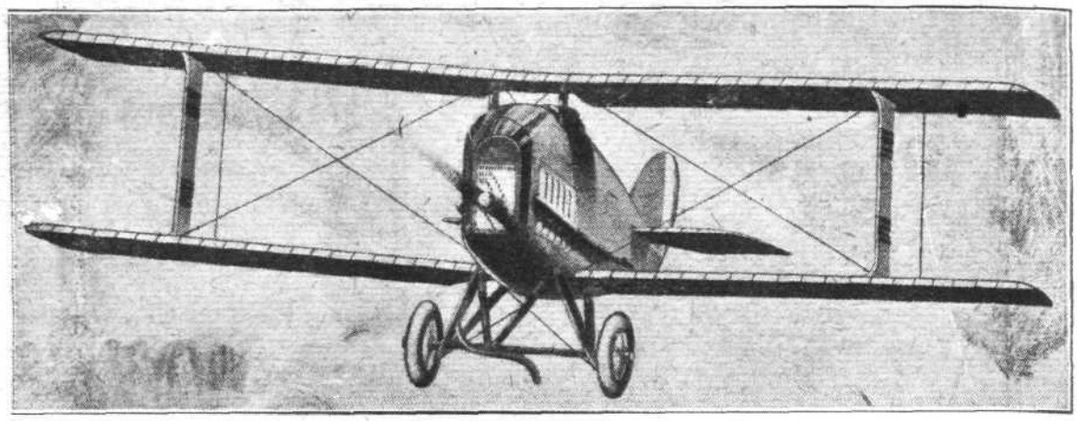
The "Owl," known in the industry as the model "H," is a large land biplane of 1,200 h.p. It is of the twin *fuselage* and centre *nacelle* type, and so designed that, by installing one of three different *nacelles* and a few minor changes, it may be used for transporting mail or express passenger carrying or night bombing.

The outstanding features that identify this machine among others are the *monocoque fuselage* and *nacelle*, the intercommunicating petrol system and the fire-extinguishing



At the New York Aero Show: The Dayton-Wright K-T Cabin Cruiser.

At the New York Aero Show: The Horace Kean "Ace" K-1 Sport Plane.



system. The wing construction is of the Pratt truss type, and consists of three upper and three lower panels of 11 ft. chord and equal spans with an 11 ft. gap. Each wing is equipped with balanced interchangeable *ailerons*. Ribs are built up first and then slipped over the beams which are built up of four pieces, thus forming a hollow box section; the top and bottom are of spruce and the sides of birch. The internal wire bracing is double and of No. 8 solid piano wire and $\frac{3}{16}$-in. hard cable. All external wire fittings are applied directly to the beams and project through the covering.

The *fuselages* and *nacelles* are supported between the upper and lower planes on tubular struts which are thoroughly streamlined. A 12-cylindered high-compresssion Liberty engine is streamlined into the nose of each *fuselage* and the *nacelle*, each engine driving a tractor propeller. The main load and crew are carried in the *nacelle*, while each *fuselage* has a small auxiliary compartment for excess mail or cargo.

The tail is of the biplane type, attached to the rear end of the two *fuselages*. It consists of two double cambered horizontal stabiliser planes superimposed, with elevators attached and a fin on the top of each *fuselage* followed by a balanced rudder. A third balanced rudder is installed midway between the two.

The landing gear is of the six wheel, two axle type with the outer two wheels side by side directly under the centre of each *fuselage* and the other two wheels spaced equally between.

The specifications of the "Owl" are:—

Overall span	105 ft.
Overall length	53 ft. 9½ ins.
Overall height	17 ft. 6 ins.
Chord	11 ft.
Gap between wings	11 ft.
Angle of incidence (upper wing)	4½°
Angle of incidence (lower wing)	3½°
Wing curve	U.S.A. No. 6
Area main planes	2,200 sq. ft.
Gross weight	20,000 lbs.
Useful load	7,600 lbs.
Loading/h.p.	16·6 lbs.
Loading/sq. ft.	9·1 lbs.
Maximum speed	110 m.p.h.
Minimum speed	55 m.p.h.
Range, full speed	10 hours

The "Butterfly" is a one-man sport-model monoplane designed by J. L. Cato, and similar to the Cato Parasol described in FLIGHT for October 9, 1919.

It has a factor of safety of 12, a true *monocoque fuselage* and a loading of 10 lbs. per horse-power. The simplicity striven for is attained in its interchangeability of rudder and elevator, *aileron*, landing struts, wing supports and horizontal stabilizer.

The motor mounting is such that the complete power plant may be removed by unscrewing four nuts.

The specifications for the "Butterfly," model "L," are:—

Span	29 ft. 9 ins.
Chord	84 ins.
Height overall	5 ft. 10 ins.
Length overall	19 ft.
Weight (gross)	978 lbs.
Useful load	9.383 lbs.
Loading per square foot	5·2 lbs.
Weight per horse-power	13·5 lbs.
Speed, maximum (horizontal flight)	72 m.p.h.
Speed, minimum (horizontal flight)	30 m.p.h.
Climb	4,800 ft. in 10 min.
Radius of flight, full load	6 hours
Motor	Cato 68-70 h.p.

Orenco (Ordnance Engineering Gorporation).—The Orenco exhibits consisted of a ¼-scale model of the "Comet" two-seater sporting mono plane, and the type F 4-seater touring tractor biplane. The former is to be one of the chief features of the company's programme for the coming season.

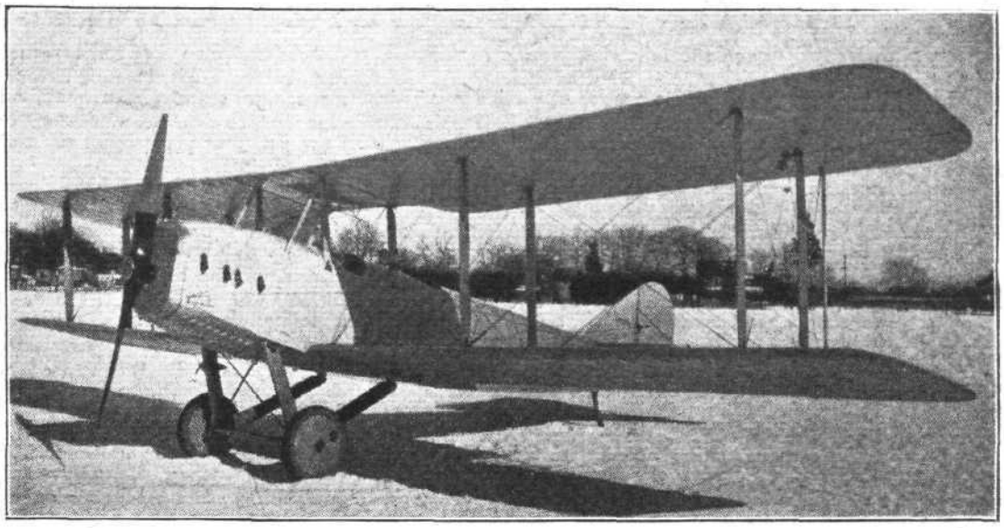
The new Orenco "Comet" has several features which promise to bring it to the fore in its class. It is easy of access. The entrance is through an aperture in the side and top of the *fuselage* at the immediate rear of the trailing edge of the left wing. The seat for the passenger folds up so the pilot can walk to his position. Once the passenger is in, his seat is dropped into place.

The line of the ignition system runs through the lock of the doors in the *fuselage*, and the circuit is not complete until the doors are securely locked. This prevents the starting of the plane until the doors are securely locked, thus preventing the starting of the plane with an open door.

Vision is another feature which attracts attention. The pilot has the usual range over the top, and can see the ground,

AT THE NEW YORK AERO SHOW: The L.W.F.-Cato "Butterfly" Sporting monoplane.

At the New York Aero Show: The "Orenco" model F. 4-seater "Tourist."



forward and back on either side, through the panels of non-breakable glass set in the sides of the *fuselage*. He can see both wheels of the landing gear.

Each wing is fixed in place by four bolts joining it to the top of the *fuselage* and two tension-compression members joining with the bottom. There are no wires. The plane will be driven by an Anzani radical air-cooled 50 h.p. engine. The "Comet" will sell for $4,500.

The four-passenger tourist is a workmanlike job that seats four, two side by side in each cockpit. It is driven by a 150 h.p. Hispano-Suiz engine and has a speed near the ground of 90 m.p.h., 84 miles at 5,000 ft. and 78 miles at 10,000 ft. The wing spread is 38 ft. and the overall length is 25 ft. 10 ins.

Thomas-Morse Aircraft Corporation.—The feature of the Thomas-Morse exhibit consisted of the M.B.4 mail plane—illustrations of which appeared in our last issue.

The plane has two *fuselages* and a *nacelle*. The engines are in the *nacelle*, set tandem, one driving a pusher and the other a tractor propeller. The tail services are not joined. The construction throughout is laminated wood. It gives the plane an extreme lightness. Its useful load is 2,610 lbs., or only 280 lbs. less than the weight of the craft itself.

A cross section of the wings of the Thomas-Morse plane is more nearly like the cross section of the wing of a bird than that of the other planes. The leading edge is heavy like the great wingbone of a bird, and the trailing edge is the thickness of a single strand of wire.

The pilot rides in the left *fuselage* nose and the pilot mechanic in the right. Each has a set of controls. The controls of the mechanic, however, are flexible after being subjected to a pull of 20 lbs. Thus, if he were to freeze the stick in any position the pilot in the left *fuselage* could control the plane by merely exerting first a pull of 20 lbs., to free the services from the influence of the frozen stick, and then manipulating just as if the control system were single. The operation cannot be reversed, that is, the mechanic cannot take the machine from the pilot.

Span	45 ft. 6 ins.
Overall length	25 ft. 5 ins.
Area of main plane	645 sq. ft.
Gross weight	5,564 lbs.
Loading/h.p.	8·2 lbs.
Loading/sq. ft.	8·65 lbs.
Maximum speed	112 m.p.h.
Minimum speed	53 m.p.h.
Power plant	2 His.-Suiza H/300 h.p.

Side view of the Thomas-Morse twin-engine, twin-*fuselage* biplane

AERIAL NAVIGATORS' CERTIFICATES

THE Air Ministry has issued the following Notice to Airmen, No. 29 :—

"With the development of air travel the science of air navigation is of growing importance and regulations have accordingly been drawn up laying down the qualifications required to obtain Aerial Navigators' Certificates, or Licences to navigate a civil passenger or goods aircraft under the Air Navigation Regulations, 1919, Schedule 2 (4).

"Provision has been made for five classes of Certificates :—

Aerial Master Navigator.
Aerial Navigator, 1st Class.
Aerial Navigator, 2nd Class.
Aerial Navigator, 3rd Class.
Aerial Navigator, 4th Class.

"The qualifications required to obtain each Certificate are as follows, but it should be noted that before a candidate is allowed to secure any of the three higher certificates he must have qualified first as an Aerial Navigator, 4th Class :—

"Aerial Master Navigator

"(1) *Must pass Calshot R.A.F. Course or an examination based on Calshot Course—Syllabus D*—subsequent to March, 1920, have had 100 hours' experience of navigation in the air and be qualified in the theory of navigation at a standard similar to that required for a naval navigator 2nd class ships, and/or

"(2) Must be qualified as navigator, 1st class ships, with not less than 60 hours' experience of navigation in the air, including a 5-hour test flight by day over the sea, out of sight of land, and the use of the sextant D.F. W/T and such further tests as may be ordered, and/or

"(3) Must hold Board of Trade Master's Certificate with not less than 60 hours' experience of navigation in the air, including a five-hour test flight by day over the sea out of sight of land, and the use of the sextant, D.F., W/T. and such further tests as may be ordered.

"Aerial Navigator, 1st Class

"(1) *Must pass Calshot Course or an examination based on Calshot Course—Syllabus D*—subsequent to March, 1920, and be certified competent as an aerial navigator, 1st Class, and/or

"(2) Must be qualified as a navigator, 1st class ships, with not less than 40 hours' experience of navigation in the air, and/or

"(3) Must hold the Board of Trade Master's Certificate with not less than 40 hours' experience of navigation in the air.

"Aerial Navigator, 2nd Class

"(1) Must be qualified as a navigator, 2nd class ships, with not less than 20 hours' experience of navigation in the air, and have passed satisfactorily a test flight with examiner, and/or

"(2) Must hold a Board of Trade Mate's Certificate with not less than 20 hours' experience of navigation in the air, and have passed satisfactorily a test flight with examiner, and/or

"(3) Must hold the Royal Geographical Society's Diploma in astronomy, including the use of the sextant, with not less than 50 hours' experience of navigation in the air, and have passed satisfactorily a test flight with an examiner, and/or

"(4) Must have passed Andover R.A.F. Higher Navigation Course between September, 1919, and February, 1920, and be qualified as aerial navigator, 2nd class, and/or

"(5) Must pass an examination based on Syllabus C, have had more than 50 hours' experience of navigation in the air, and passed satisfactorily a test flight with an examiner.

"Aerial Navigator, 3rd Class

"(1) Must have passed Andover R.A.F (Day and Night) Course since May, 1918, with a V.G. report and have had more than 100 hours' air experience including not less than 15 hours' night flying, and/or

"(2) Must have passed an examination based on Syllabus B, and have had more than 100 hours' air experience with not less than 15 hours' night flying.

"Aerial Navigator, 4th Class

"(1) Must have passed Andover R.A.F. Course since May, 1918, with a V.G. report and had 100 hours' air experience.

"(2) Must have passed Stonehenge R.A.F. Course since May, 1918, with a V.G. report and had 100 hours' air experience.

"(3) Must have passed Eastchurch Course since May, 1918, with a V.G. report and had 100 hours' air experience.

"(4) Must pass an examination based on Syllabus A, and have had more than 100 hours' air experience.

"As the science of air navigation is still in its infancy it is impossible to fix definitely, at the present stage of development, final standards of qualifications for the various classes of aerial navigators, and the present tests must, therefore, be regarded as provisional and as being liable to revision from time to time.

"Aerial navigators 4th class will only be licensed to navigate civil aircraft over land by day, those qualified for the 3rd class certificate will be licensed to navigate over land only by day and night, while those attaining to the higher classes will be licensed to navigate over both land and sea by day and night.

"Applicants for any of these licences must produce a medical certificate in conformity with the Air Navigation Directions, 1919, Section 2 (4-9).

"The courses referred to at Andover, Stonehenge and Eastchurch were R.A.F. courses available to R.A.F. officers during a period of the War and cannot now be taken.

"The Calshot course is that of the R.A.F. Air Navigation School at Calshot. If found desirable it is possible that this course may be opened to civilians on payment of certain fees. Arrangements have been made to enable candidates who may wish to secure an aerial master navigator's certificate or a certificate as an aerial navigator, 1st class, to sit for an examination based on the Calshot course without having to take the course itself. Similiar examinations will be held to enable candidates to take certificates under Syllabuses A, B, and C.

"There will be two assessments only—'Pass' and 'Fail,' for the examinations carried out under any of these syllabuses. A 'Pass' will be given where a candidate obtains 75 per cent. on the whole examination and not less than 60 per cent. in each subject. If a candidate fails to obtain 60 per cent. in any subject or 75 per cent. on the whole examination he shall be deemed to have failed in the whole examination and will not be allowed to sit again until at least six weeks have elapsed.

"A further announcement will be made later regarding the steps to be taken by those who wish to avail themselves of an opportunity of qualifying for these certificates by examination."

SYLLABUS "A."

For Aerial Navigator, 4th Class

Ground Work.

Definitions.—Sphere, Poles, Rhumb-line, Great Circle, Small Circle, Equator, Parallel of Latitude, Meridians, Latitude, Longitude, *d* Latitude, *d* Longitude. Course—True, Magnetic and Compass, Drift Angle, Track.

Map Reading.—Method of measuring distance and angles on Maps and Charts. Conventional Signs, Distinctive Characteristics. Identifying position by maps and course steered and time aided by a photograph—Contours—VI., HE., Scales Projections, Preparation of a map for cross-country flying.

Compass.—Magnetic variation and deviation, Practical Compass correction.

Courses and their corrections.

Flight.—Dead-reckoning measurement of speed ground and air. The Air Speed Indicator and Computer. The triangle of velocities. Course and Distance Calculator. Drift Bearing Plate Flying over two known objects to get ground speed and course.

Regulations for Prevention of Collisions in the Air.—Aerodrome Control. System of lights and daymarks.

Air Work.

Practical demonstration of principles learnt in Ground work :—(1) Flight by map alone; (2) Flight by compass alone on pre-determined course and time, turning point to be indicated—pin pointing. (3) Flights by Drift Bearing Plate. Passing out test to consist of a long distance cross-country flight of, say, 150 miles in all;

SYLLABUS "B."

For Aerial Navigator, 3rd Class

Ground Work.

Definitions.—Sphere, Poles, Rhumb-line, Great Circle, Small Circle, Equator, Parallel of Latitude, Meridians, Latitude, Longitude, *d* Latitude, *d* Longitude. Course—True, Magnetic and Compass, Drift Angle, Track.

Map Reading.—Method of measuring distances and angles on Maps and Charts, Conventional Signs, Distinctive Characteristics. Identifying position by maps and course steered and time aided by a photograph—Contours—VI., HE., Scales Projections, Preparation of a Map for cross-country flying.

Compass.—Magnetic variation and deviation, Practical compass correction.

Courses and their corrections.

Flight.—Dead-reckoning measurement of speed ground and air. The Air Speed Indicator and Computer. The triangle of velocities, Course and Distance Calculator. Drift Bearing Plate Flying over two known objects to get ground speed and course.

Regulations for Prevention of Collisions in the Air.—Aerodrome Control. System of lights and daymarks.

Airwork.

Practical Demonstration of principles learnt in Ground Work:—(1) Flight by may alone. (2) Flight by compass alone on pre-determined course and time, turning point to be indicated—pin pointing. (3) Flights by Drift Bearing Plate. Passing out test to consist of a long distance cross-country flight of, say, 150 miles in all, in addition, 15 hours' night flying and a cloud flying test with examiner.

SYLLABUS "C."

For Aerial Navigator, 2nd Class

Ground Work.

Definitions.—Sphere, Poles, Rhumb-line, Great Circle, Small Circle, Equator, Parallel of Latitude. Meridians, Latitude, Longitude, *d* Latitude,

d Longitude. Course—True Magnetic and Compass. Great Circle Sailing. Mercators Sailing.

Charts and Maps.—Conventional Signs. Method of measuring distance and angles on them. Mercators and Gnomonic projections.

Compass.—Magnetic Variation and Deviation. Compass Correction—Practical and Theoretical.

Courses and their correction.

Flight.—Dead-reckoning, measurement of speed ground and air. The Air Speed Indicator and Computer, Triangle of Velocities. Course and distance Calculator, Drift Bearing Plate.

Chronometers.—Care of: Rating.

Sextants.—Reading and use.

Astronomical Definitions.—Declination. Right Ascension. R.A.M.S. Equation of time, Mean Time, Apparent Time, Astronomical Time, Sidereal Time, Longitude in Time, Hour Angle. Dip, Refraction, Parallax, Altitude, Zenith, Visible Horizon, Sensible Horizon, Rational Horizon, Ecliptic Equinoctial, Prime Vertical, Azimuth, Amplitude, Position Line. Intercept.

Star Maps.—How to find a star. Method of determining latitude by Meridian Altitude of Sun or Star.

Working Observations.—(1) The Summer line. (2) Double Altitudes.

General.—International Rules for Air and Sea Navigation. Meteorology. Weather Maps. Wind. Clouds. General knowledge of the change of Meteorological elements.

D.F.N. (Directional Finding Navigation).—Uses of D.F.N. Definitions. Principles D.F.H.—Charts required. Gnomonic Projection: Principle Construction, etc. Mercators. Projection. Principle Construction, etc. Conversion angle. Quadrantal error: Method of obtaining. Method of working out bearings. Examples. Position lines and fixes. Laying of Bearings to time. Laying of Bearings on charts. Method of working out problems in wind and alteration of course necessary. Swing of machines. Construction of Q.E. Tables. Lines of equal Bearing. Homing.

Air Work.

Must have had 50 hours' experience of navigation in the air by day and 20 hours' night flying.

SYLLABUS "D."

For Aerial Master Navigator and Aerial Navigator, 1st Class

Meteorology (Advanced). Ground Work.

Weather Maps.—Indication of pressure distribution. How weather maps are prepared. Isobars. Paths and positions of cyclones and anti-cyclones.

Wind.—Relation of, to pressure distribution. Weather associated with winds from different directions in typical pressure distributions. Increase of wind and change of direction with height.

Clouds.—Determination of height by means of type. Description of different types, conditions of their formation, heights of formations. Flying conditions associated therewith.

General.—Conditions favourable for fog, rain, thunderstorms, etc. Relationship of temperature with altitude. Diurnal and nocturnal changes of wind, fog and cloud. Estimation of upper wind from cloud movement. Reading and correction of Barometer. Reading of meteorological instruments carried in aircraft. Convection in relation to Meteorology. The Heating and Cooling of the Atmosphere. Effect of Moisture in the Atmosphere. Forecasting over large areas. Formations of rain bands and paths, and their position in relation to depressions.

Mathematics.

Plane Trigonometry. Spherical Trigonometry. Use of Mathematical Tables. Dynamics (elementary).

General Navigation.

Definitions. Use of Traverse Table. Meriditional parts. Plane Sailing. Great Circle Sailing. Mercator Sailing.

Nautical Astronomy.

The Sextant.—Use and Adjustment. The Chronometer. Taking Sights of Sun (on ground). Determination of Index Error. Effect of acceleration on a pendulum. Artificial, including gyrostatic horizons.

The Solar System.—Description. Recognition of Stars. Definitions (to include) Celestial Sphere. Geographical Position. Celestial Poles. Celestial Equator. Meridians. Polar Distance. Right Ascension. Zenith. Celestial Horizon, Observer's Meridian Altitude. Zenith Distance. Azimuth. Hour Angle.

Time.—Time and Hour Angle. A.T.P. Apparent Solar Day. Mean Sun. Mean Solar Day. M.T.P. Equation of Time. Year. Standard Time. Greenwich Date. Astronomical Day. G.M.T. Change of date. Leap Year. R.A.M.S. R.A. Meridian Sidereal. Time.

Altitude and Azimuth.—H.A. of Heavenly Bodies. Star Sights (on ground). Use of Altitude Table and Azimuth Diagram. Nautical Almanac. Determination of True Altitude.

General.—Solution of Spherical Triangle with logs. Special Slide Rule. Veater's and other Gnomonic Diagrams. Inman's Tables. Theory of Position Lines.

Sights.—Star Sights in Air. Special Cases, *e.g.*, Equal Altitude, Polaris, etc. Moon Sights and Fixes by Star, Moon and Planet Sights. Bubble Sextant. Time of Sunset and Meridian passage.

Directional Finding Navigation.

Introduction.—Uses of D.F.N. Present and Past Methods. *Definitions. Principles of D.F.N.*—Charts required. *Gnomonic Projection.*—Principle, Construction, etc. *Mercator's Projection.*—Principle, Construction, etc. *Conversion Angle. Quadrantal Error.*—Method of obtaining same. *Method* of Working Out Bearings: Examples. Position Lines and Fixes. Laying off Bearings to Time. Laying off Bearings on Charts. Method of Working out Problems on Wind and Alteration of Course Necessary. Swinging of Machines: Construction of Q.E. Tables. Lines of Equal Bearing. Homing.

WIRELESS TELEGRAPHY

Elementary Electricity and Magnetism.—Definitions. Static Electricity. Method of Production. Condenser. Current Electricity. Primary and Secondary Cells.

Magnetism.—Permanent Magnetism. Magnetised Steel. Lines of Force. Fields.

Electro-Magnetism.—Magnetic Effect round a Straight Wire. Effect of coiling Wire and adding Soft Iron Core. Comparison with permanent Magnet.

Electro-Magnetic Induction.—Production of Electric Currents in a Wire. Why lines of force should be a varying quantity. Generators. Self and Mutual Induction. Induction Coils. Circuits. High Voltage.

Transformers.—Construction of Primary and Secondary Coil. "Stepping up" and "Stepping down."

Principles of Wave Motion.—Æther. Reasons for belief in and comparison with waves of water. Definitions. Laws of Pressure Waves. Characteristics. Properties of oscillatory Circuits.

Oscillatory Circuits.—Production of Æther Waves. Inductance Capacity. High frequency resistance. Relation between Spark and Oscillation Frequency. Relation between wave length and L.S. value of circuit. Coupling Turning. Closed and open Circuits.

Transmission Circuits.—Diagram and Skeleton Branch Circuit. Function of Circuits. Effect of Coupling on Tuning. Two frequencies in coupled circuits. Tuning to a given wave length. Transmitting Apparatus. Beacon Stations and their operation.

Reception.—Simple working set and diagrams. Theory. Resonance and Tuning in receiving sets. Crystal detectors. Telephone Receiver. Reception of W/T Waves on ordinary Aerials. Closed Coil used for reception. Amplification.

Valves.—Electron theory application. Characteristics of 2 and 3 electrode valves. Spark reception. Rectification. Amplification. T.F. Receiver. Seven valve amplifier.

Directional Wireless.—Directional qualities of a coil. Decrease in signal strength for angular displacement of coil. Minimum Method. Maximum Method for Aircraft. Fitting of Machines. Wing Coils.

Quadrantal Error.—Cause and Method of Compensation.

AIR WORK.

Long flights by Day and Night Navigating by Sextant and bearings by D.F. W/T.

CORRESPONDENCE

[The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.]

SUPREME COMMANDS

[2007] I notice in your admirable leader on the subject of the First Lord on naval policy that you make a statement which I think may lead to a certain amount of misunderstanding. Although it is generally agreed that any scheme of dual control of operations would be bad and unworkable, I am afraid that your comment may be seized upon by those conservative naval and military hostile critics to the Air Service, who would *never* allow the Air Service to occupy any but a subordinate place in any scheme of operations. While it is agreed that where the Air Force, when it is employed in the assistance of armies or fleets, must be, as you say, for the purpose of military command, under a superior naval or military authority, yet I am sure the time will come, and probably much sooner than some of the old "dug-outs" anticipate, when, as foreshadowed by Mr. Winston Churchill in his speech on the Army Estimates, the Air Force may be the predominant partner in some special scheme of operations which may require the co-operation of either the navy or army. In such a case, of course, there can be no doubt that the command would be vested in the Royal Air Force, and the particular naval or military units detailed off for co-operation would have to pass under that superior command. From your remarks on this subject in your issue of February 26, I gather that you are in agreement with this view, but it is a very hard pill for the Admiralty and the War Office to swallow, and the former seems determined to fight to the last ditch before it will accept the inevitable.

"Ex R.A.F."

AVIATION IN PARLIAMENT

The Leeds-Holland Service

MR. RAPER, in the House of Commons, on March 23, asked the Under-Secretary of State to the Air Ministry whether, on a recent commercial flight from Blackburn to Holland, the machines employed had to waste a whole day in reporting to Lympne before proceeding overseas?

The Under-Secretary of State for Air (Major Tyron): My hon. friend possibly refers to a recent commercial flight from Hull to Holland which has already been the subject of a question. The necessity for landing at Lympne in such cases was fully dealt with in the reply. The amount of time spent at Lympne is largely dependent upon the time-table arranged by the organisers of the flight.

Mr. Raper: Is it proposed that in all commercial flights machines from all parts of this country must first go to Lympne, whether they come from Scotland or Plymouth or anywhere else?

Major Tryon: That is not the purport of the answer which I have already given.

Air Ministry Inspection Department

MR. MACQUISTEN asked the Under-Secretary of State to the Air Ministry whether ex-Service men in the Inspection Department of the Air Ministry are being dismissed while non-Service men and non-regimental officers are being retained; and is he aware that these non-Service men are connected with the Deputy Controller by ties of affinity, consanguinity, or otherwise?

Major Tryon: The staff of the inspection directorate is still in process of reduction to peace establishment. In considering what persons should be retained, preference is given to ex-Service men. Non-Service men and non-regimental officers are retained only where it is clear that they possess superior qualifications for the work, namely, special aeronautical and engineering qualifications not possessed to an equal extent by the ex-Service men being dismissed. With regard to the second part of the question, I have made special enquiry into the complaint made to the Air Ministry on March 10, to which, I presume, my hon. friend refers, and I am satisfied that it is fully covered by my answer to the first part.

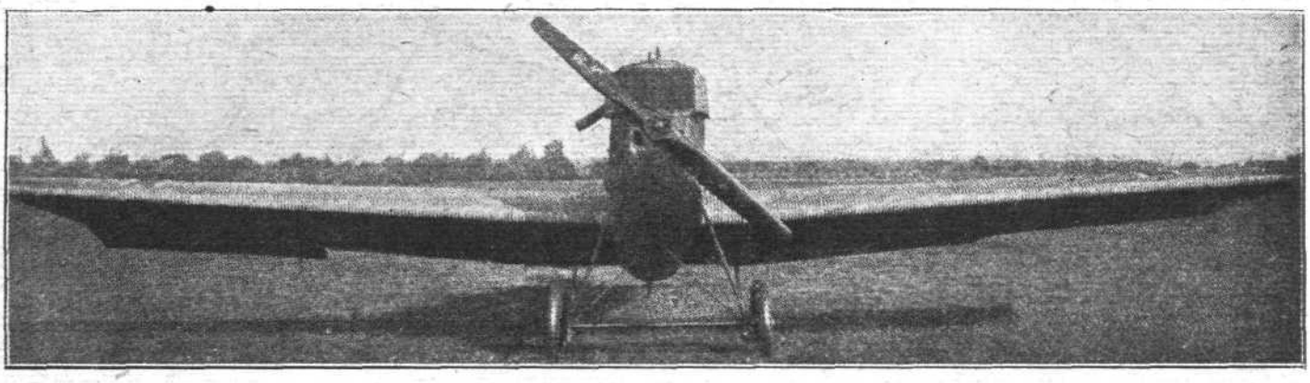
THE JUNKER SINGLE-SEATER ALL-METAL MONOPLANE, TYPE D1*

The aeroplane forming the subject of the report was examined at Evere aerodrome, near Brussels. Its earlier history is unknown, but the *fuselage* showed clearly that it had been struck by several bursts of machine-gun bullets.

The evidence for its classification as a D 1 model is mentioned under the heading "Painting."

While the aerodynamic design is interesting, the constructional features are judged to be of great importance. The machine is entirely constructed of metal, is unarmoured, and carries still further the positive system of control and the elimination of cables noticed in the case of the biplane.

It may be mentioned, in passing, that the machine had been dumped in the open, and had shared the varied weather of several months with other machines constructed of wood and fabric materials. The Junker had hardly suffered, while the orthodox type of machine had seriously deteriorated. In some places, however, the duralumin sheet was covered with a thin coating of white crystals, and appeared to have become brittle.



Front view of the Junker D 1 monoplane

General Particulars

Type of machine	D 1 monoplane.
Purpose	Single-seater fighter.
Engine	180 h.p. Mercédès.
Span	29 ft. 2 ins.
Overall length	22 ft. 0 ins.
Chord (at root of wings)	5 ft. 11½ ins.
Maximum height (estimated)	9 ft. 5 ins.
Maximum cross-sectional area of body	9·25 sq. ft.
Airscrew	Axial; pitch, 2,150 mm. Diameter, 2,740 mm.
Area of each wing (with *aileron*, as far as junction with centre section)	73·6 sq. ft.
Area of one *aileron*	10·25
Area of centre section (one side)	5·8 sq. ft.
Total supporting surface (both sides)	158·8
Area of fixed tail planes (both sides)	12·2
Area of elevator	18·2
Area of rudder (estimated)	8·2
Horizontal area of *fuselage*	36·8
Vertical area of *fuselage*	64·5

* Report issued by Directorate of Research, Air Ministry.

Wings, General Design

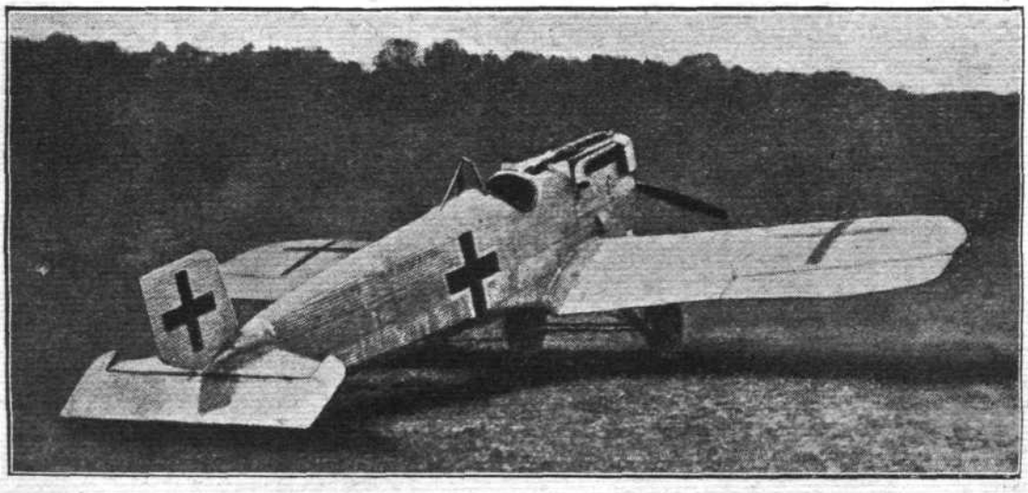
The Junker monoplane presents, at first sight, the appearance of a biplane with the upper plane removed, the wings being found where the lower plane of a biplane is usually fitted. There is a short horizontal centre section which is built up integrally with the body, and which contains seven tubular spars.

To each side of this section is attached a plane, which is shaped as shown in the general arrangement drawings. The dihedral angle is adjustable; the evidence of a German photograph indicates a dihedral angle of 3° on the upper surface of the wings. There is no sweep back.

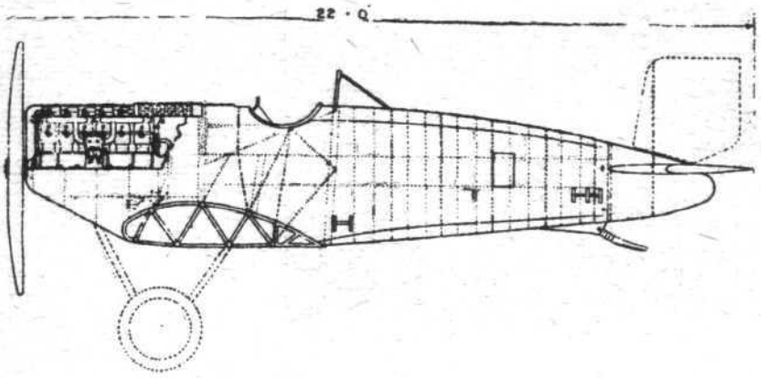
Wing Construction

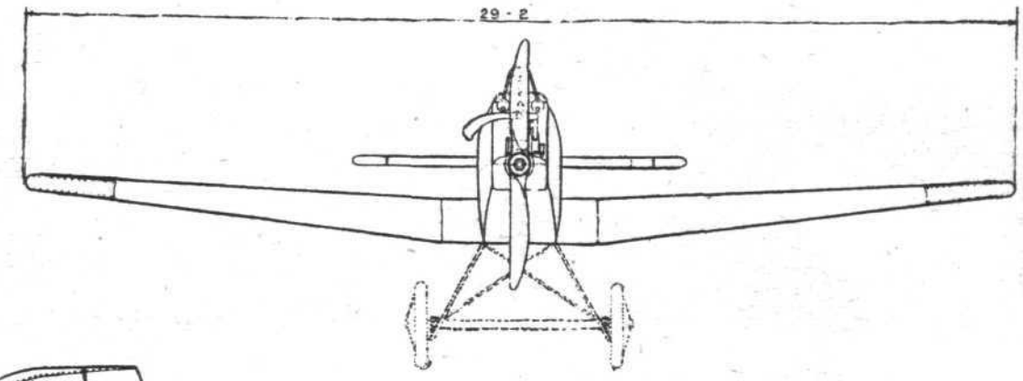
In its broad outlines the construction of the planes of the monoplane is similar to that of the biplane wings. In both Junker machines the designer has separated himself completely from the influence due to the use of the wood spars and ribs that are almost universally employed in a non-metal wing construction, and has set out to use his new material in the best possible way. Instead of two main spars crossed more or less at right angles by built-up ribs, the construction described and illustrated below has resulted.

A series of tubular duralumin spars are strongly braced by means of riveted duralumin cross-pieces, and to the frame thus formed is riveted a corrugated sheet covering, also of duralumin.



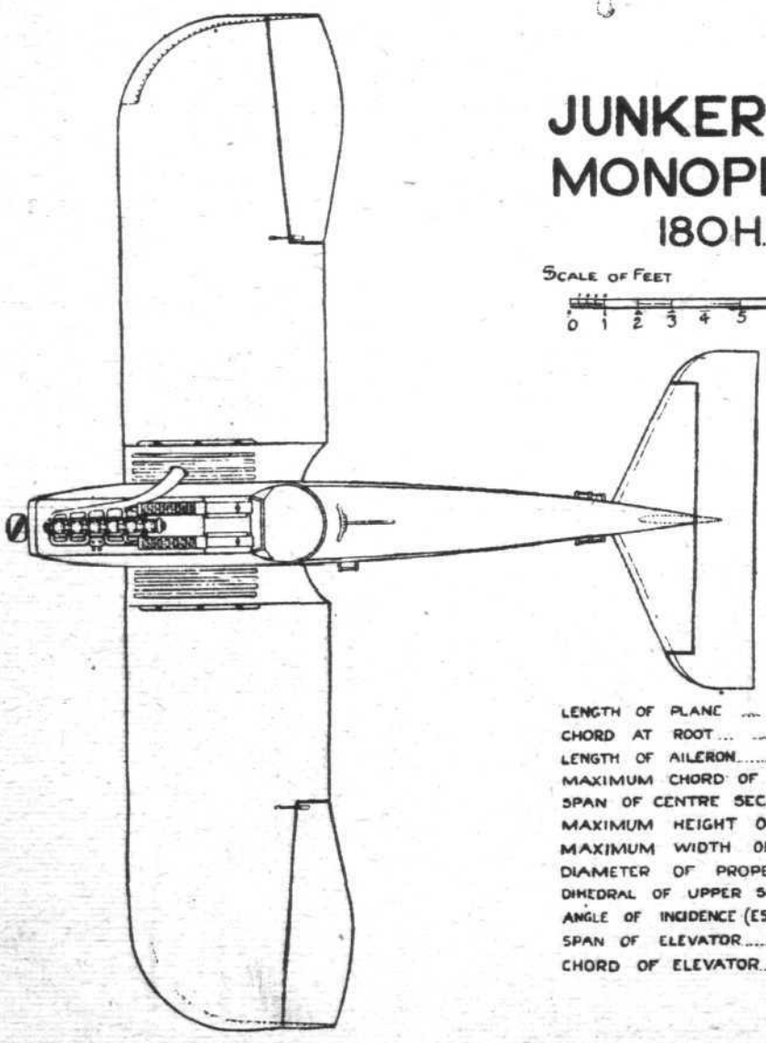
Three-quarter rear view of the Junker D 1 monoplane



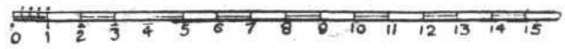


JUNKER-ALL-METAL MONOPLANE. TYPE D.I.

180 H.P. MERCEDES.

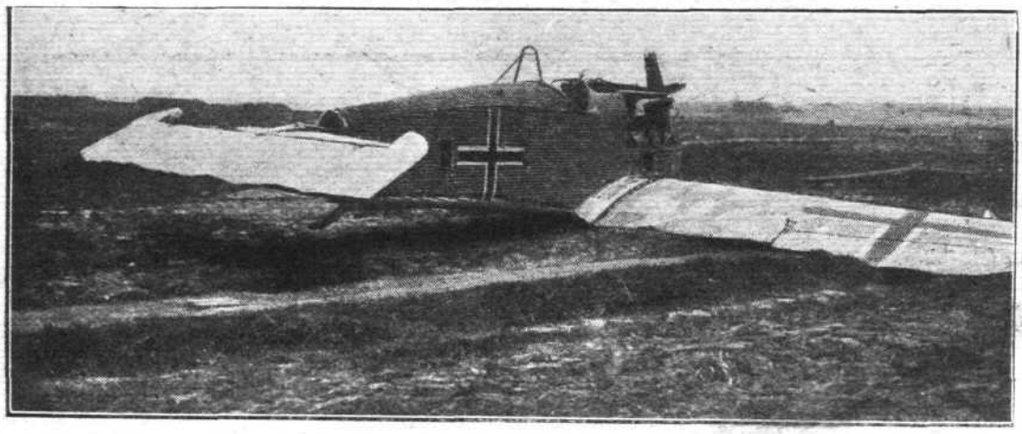


SCALE OF FEET



LENGTH OF PLANE	12	3½
CHORD AT ROOT	5	11½
LENGTH OF AILERON	6	6¾
MAXIMUM CHORD OF AILERON	1	1½
SPAN OF CENTRE SECTION	4	7
MAXIMUM HEIGHT OF BODY	4	1½
MAXIMUM WIDTH OF BODY	2	5
DIAMETER OF PROPELLER	7	2½
DIHEDRAL OF UPPER SURFACE OF WINGS (ESTIMATED)	3°	
ANGLE OF INCIDENCE (ESTIMATED)	1°	
SPAN OF ELEVATOR	9	10
CHORD OF ELEVATOR	1	9½

The Junker D 1 all-metal monoplane : Plan, side and front elevations to scale



Three - quarter rear view of a damaged Junker D 1 monoplane

Front view of a damaged Junker D 1 monoplane

The difference lies in the fact that, whereas in the biplane the interspar bracing is of duralumin tubes (except at the extreme tips, where strips are substituted), in the monoplane wings strips are used throughout the length of the plane.

The bracing strips are all similar in shape, but vary in length and thickness of metal according to position. Near the root the thickness is ·033 (about 21 S.W.G.). The section drawn in Fig. 1 is only found in the middle portion of the strip. From this section the strips gradually flatten out, so that at the extremities, where they are riveted to the spars, they are practically flat.

Fig. 1.—Section of corrugated aluminium covering, actual size

The arrangement of the bracing is worthy of attention. Each of the three upper spars is connected to the two adjacent lower spars in such a manner as to form a Warren girder, and the upper apices coincide, so that the arrangement may be otherwise described as a series of alternately inverted square pyramids of bracing strips.

Fig. 2 will explain this, and will show that no bracing strips are found between any two adjacent upper spars or between any two adjacent lower spars. It will be understood, therefore, that the corrugated covering completes the system of triangulation upon which the strength of the structure depends.

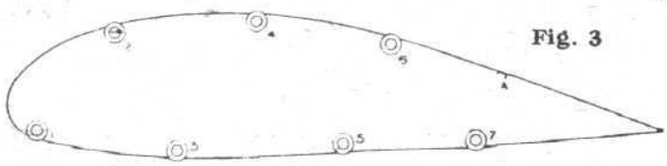


Fig. 3

The seven spars are parallel throughout their whole length

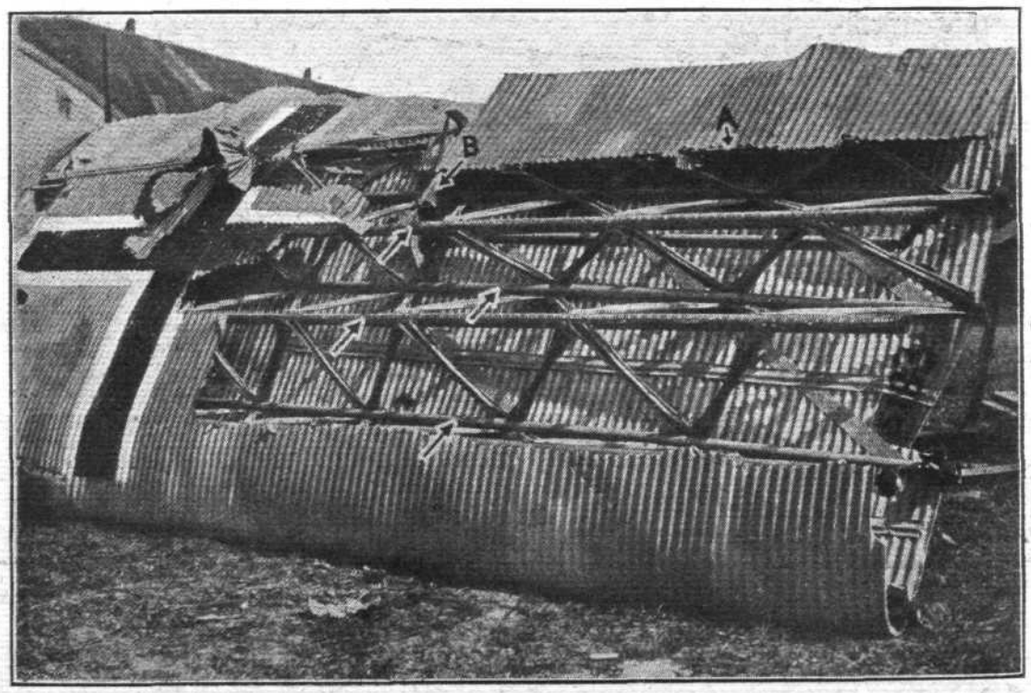


Fig. 2.

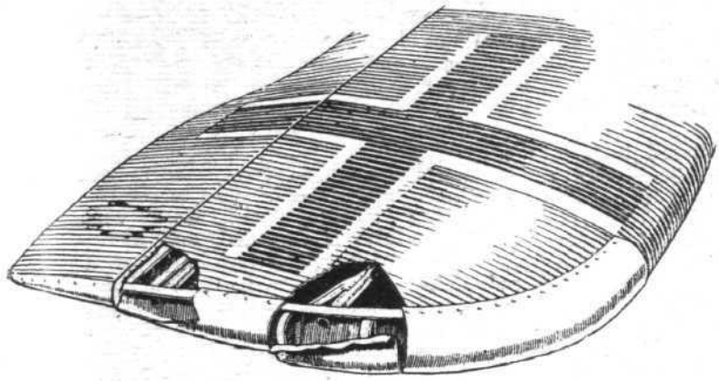


Fig. 4.

circular holes, and which is inclined at an angle to the wing spars. Four parallel strips lie along the lower surface of the wing, and connect the roots of each of the four lower spars to the *aileron* bulkhead or to the trailing edge. Each is of 24 S.W.G. duralumin, 48 mm. wide, and is riveted at 10 cm. intervals to the lower wing covering.

Between spars 1 and 3, and also between spars 3 and 5, two waved section strips, each 45 mm. wide, and of 29 S.W.G. duralumin, are riveted to the inside of the lower covering parallel to the spars. These are all plainly visible in Fig. 2.

All of the seven tubular spars are spliced. In the case of the upper spars the splice occurs 1 m. 59 cm. from the root, and the diameter decreases from 45 mm. to 40 mm. The lower spar splices are found 1 m. 27 cm. from the root, and the spar diameters before and after splice are 35 mm. and 30 mm. respectively.

The splices are similar to those described in connection with the Junker biplane, but, owing to the fact that the

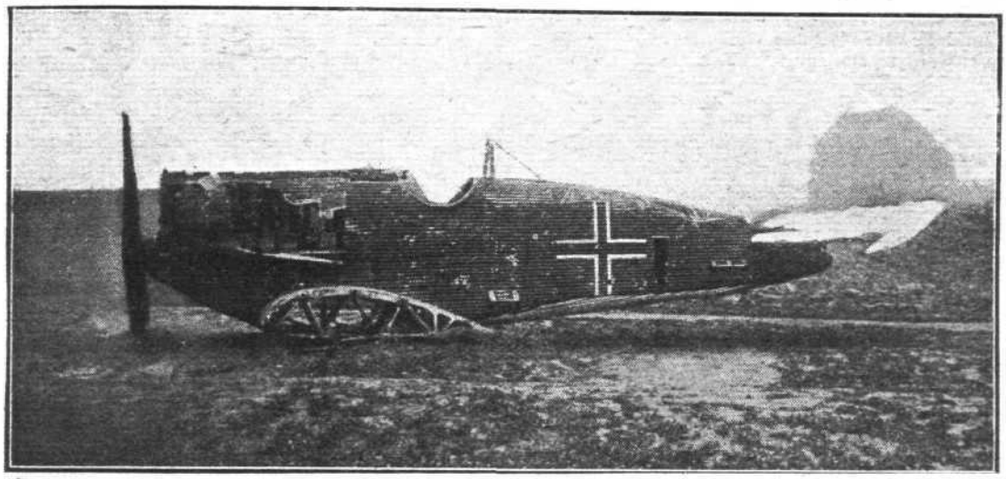


Fig. 5

as far as the plan view is concerned, but converge so that at the wing tip their extremities are almost in line.

The wing section, taken at the wing root, is drawn to scale in Fig. 3, and on this diagram are marked the various letters that are referred to from time to time in this description. From this point the section tapers consistently to the tips. The channel section piece marked A (24 S.W.G., 25 mm. wide and 15 cm. deep) may be regarded as an eighth spar, but it does not extend from end to end of the wing. It finishes at the bulkhead marked B in Fig. 2. This bulkhead, consisting of a channel sheet of aluminium, performs several important functions. Primarily, it supports the hinge necessary to the working of the *aileron* control, but it also closes the triangular gap which would otherwise be left where the *aileron* commences. It is attached by riveted strips to the spars numbered 5 and 6 in Fig. 3, and is, of course, roughly triangular in shape. The metal is of 20 S.W.G. The shape of the *aileron* is made clear in the scale drawings, and it will be noticed that its accommodation does not necessitate interference with any of the tubular spars. It is hinged to a channel section spar, which is lightened by

outside diameter of the inner tube is not very much less than the internal diameter of the outer one, it has not been found necessary to press the outside tube to a square section. Arrows marked in Fig. 2 show four of the splices.

The outer extremities of the spars are received in a channel strip, which follows the junction of the corrugated covering and the riveted-on edge found at the wing tips. (See Fig. 4.)

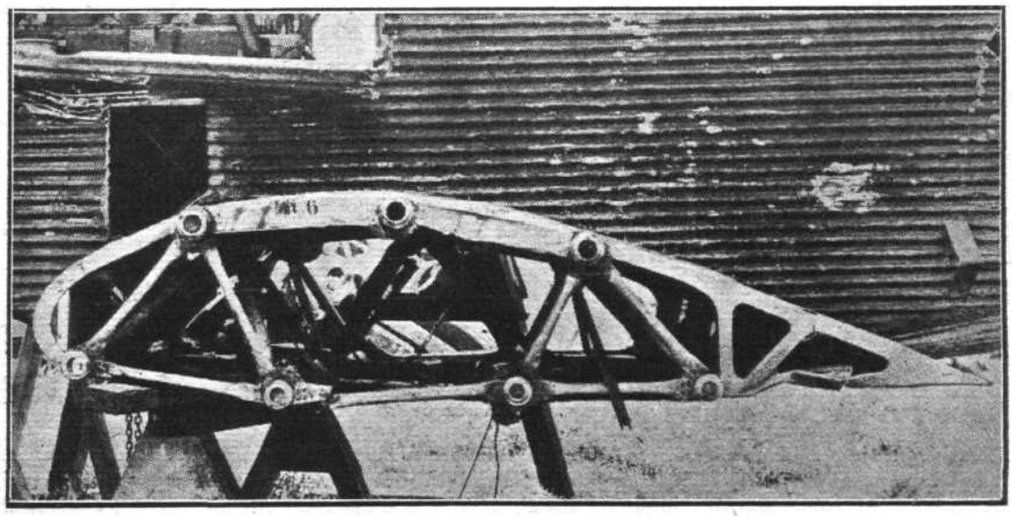


Fig. 6

The spars pass through holes in this strip, and are cut off squarely an inch or two beyond it. The ends are left open, and small angle pieces are riveted to spar and strip to com-

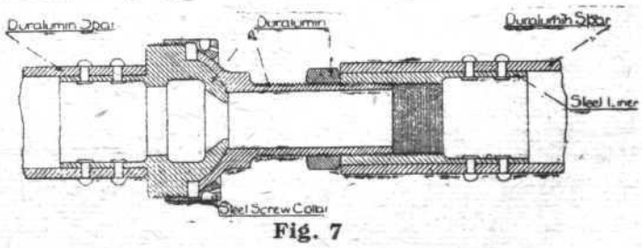


Fig. 7

plete the joint. The separate wing tip is a substantial duralumin sheet (of 20 S.W.G.), riveted to the channel strip, and between these two the corrugated wing covering is firmly held. At intervals D-shaped duralumin formers of 24 S.W.G. are riveted to strip and edge.

It is only at the tip that a separate edge is found. The wing covering consists of corrugated sheet duralumin, ·014 in. thick (about 24 S.W.G.). The pitch of corrugation is 1¼ ins. and the depth ⅛ in., of which there are seven strips lap-riveted together. Each strip forms a belt, commencing at the trailing edge, and passing right round the wing back to the trailing edge, where the two edges are riveted together. Spars and covering are joined by iron rivets spaced in the hollows of the waves. The two channel pieces—one acting as *aileron* spar and the other receiving the ends of the spars—meet and are riveted together at the wing corner.

Centre Section Construction and Spar Joints

The bracing of the centre section, however, is exactly similar to that of the Junker biplane; that is, the spars are connected by means of duralumin tubes, which are flattened at each extremity, and riveted to lugs welded to steel collars, which are in turn riveted to the spars. Various photographs (particularly Figs. 5 and 6) show clearly the character and disposition of this bracing. The tubes are of 20 mm. outside diameter, and the metal of 18 S.W.G.

The seven tubular spars terminate in screw collar joints, somewhat similar to those reported upon in connection with the Junker biplane, but are sufficiently different to merit description.

The junction of upper spar to upper spar is drawn to scale in Fig. 7. Instead of being immovably riveted to the spar, as is the case in the J. 1 biplane, the internal sleeve which carries the partly-spherical head is threaded, and screwed into the spar. By this means the effective length of the upper spars can be varied to the extent of several inches. The junction of the four lower spars to the corresponding tubes of the centre section is exactly similar to that employed in the case of the biplane, and is not adjustable.

This arrangement obviously allows the angle of dihedral of the planes to be capable of alteration within certain wide limits, and at the same time provides a joint of ample strength. The drawing shows which parts are of duralumin, and which of steel.

(To be continued.)

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THE FUTURE OF BRITISH FLYING

FOLLOWING up his statement setting forth his reasons for resigning from the Aircraft Manufacturing Co., Mr. G. Holt Thomas has sent to *The Times* the following letter, in which he gives some valuable suggestions as to the way in which the Government could assist aviation. Mr. Thomas writes:

"The publicity which you have been good enough to give to this subject has been so instructive that I venture again to encroach on your valuable space with a few more remarks. I am afraid of the necessity for supporting aircraft design in the national interests being mixed up with the question of supporting aircraft factories. The latter must, of course, support themselves to a large extent on other productions or close down, but the cessation of design, in which this country was pre-eminent, would be a national disaster. The whole point which I wish to make is the certain disintegration of the finest technical staffs in the world, if the present Government policy continues.

"The great advantage of my resignation is that I can speak without any one crediting me with commercial motives, and I am as free now as I was ten years ago, when I stated that the nation without a strong air force would be hopelessly beaten by the nation possessing one. The War amply proved this, and I still believe that, if in 1914 we had adopted as strong an aerial policy as that of Lord Weir in 1918, the War would have come to an end very much sooner. Being now, as I am, a free-lance, there is no reason why I should not put myself in the supposed position of Air Minister, and consider what I would do in that position.

"First, I should have told my Government that neither Navy nor Army could work without the Air, and that I am determined to have a portion of their Estimates. I would have convinced them that any possible invasion of this country in the future must inevitably be by air, and that neither Army nor Navy would be able to assist in the defence. I would say, British design is supreme; a handful of designers only require to be supported, and I must have a million to spend on new type machines. I intend to order, in accordance with the size of the technical staff, a few machines at high prices. I am going, for instance, to possess, even in peace time, the fastest single-seater fighting scout in the world, and when I have got it I am going to ask for a faster and better one. This will be the cheapest million out of the 200 odd millions you are going to spend for national defence, and will keep us ahead of all countries, and ready for emergencies. But it will not sustain sufficient pilots, mechanics, constructors, etc., and to meet this difficulty, I propose a special Vote for Civil Aviation, which has proved itself of commercial value, but which cannot exist unassisted.

"AIR MAIL, LONDON–PARIS.

"Correspondence addressed to Paris will thus be accelerated by 16 hours.

"Correspondence for countries beyond France will normally be accelerated by 24 hours.

"This statement is not mine. I have often taken it down from a notice which is in every post office. It emanates from the Postmaster-General. Is it a commercial asset for the trade of this country to use this very great saving in time? A surcharge of 1*d.* on first-class mail letters to the Continent would leave a profit to the Post Office, and I am certain that no one would grudge it for increased speed. Thousands of pounds are spent daily on inefficient telegrams, not at a penny a letter, but at twopence a word, in the hope of quickened communications. The London to Paris service and the London–Hague service are absolute necessities to British commerce, the two routes embracing the routes from these islands to the whole of the rest of the world. Both the French and Dutch are supporting, or willing to support, these routes. The French already pay; the Dutch are willing to bear half the cost. My suggestion of a surcharge of 1*d.* a letter, and to send all first-class mail matter by air, would solve the whole question. Going farther afield, a route from Cairo to Karachi would save eight days on the Indian mail. A surcharge, say, of 3*d.* a letter would enable this line to be opened on a commercial basis, if all first-class mail matter were sent by air. Is it to the interest of British and Indian trade, especially as it would provide a large number of machines, pilots, etc., ready for any Imperial emergency, or not?

"Whilst I belive in the findings of committees, I have no faith in their recommendations being adopted in time to save the situation. The Civil Aerial Transport Committee, which sat for over twelve months, and of which I was a member, foresaw in 1917 exactly the position now arisen. It made many recommendations which, if adopted, would have been of great service, I am exceedingly grateful, as I am sure every one interested in this subject of vital importance to the nation will be, for the assistance *The Times* is giving; but it is high time that Parliament and public realised the position. The camouflage, not necessarily wilful, but none the less camouflage, of 'blazing trails' and 'aerial lighthouses' for machines to fly by night when they cannot even afford to fly by day, has led the public to believe that we are maintaining 'the lead' which every Minister says is so vital. We are not. With the aerial world at our feet, we are making no effort to grasp it. Every country in the world is anxious to adopt British aviation, and not less, I think, because of the London–Paris service running to scheduled time in almost any weather. With the exception of the belligerents, aviation has no being in other countries. They are all open to start, and our opportunities are enormous, but we can do nothing unless we are strong enough at home.

"Again, I would repeat that I have no axe to grind, and am solely interested in obtaining public support for British aviation and the maintenance of Great Britain as an aerial Power."

◈ ◈

A Soviet Aeroplane Captured

AN aeroplane coming from Soviet Russia has fallen into the hands of the Lithuanian authorities. Among the passengers who were taken prisioners, was M. Platten, a well-known Swiss Communist and a former member of the Swiss National Council.

◈ ◈

The Wright Memorial at Le Mans

THE monument which has been erected by the town of Le Mans in memory of Wilbur Wright, who made his first flights at the Hunandières race-course, near by, is now ready. It is to be unveiled shortly by M. Flandrin, the Under-Secretary of State for Aviation.

FLIGHT

AIRISMS FROM THE FOUR WINDS

So it looks as if the M.O.M.-Rosebery-Turnhouse aerodrome controversy will find its solution in the Edinburgh Town Council acquiring the property. Lord Rosebery apparently has no say in the matter, but has to submit to the Dora ramp clauses. It is at least a certain amount of satisfaction to learn that, in the event of the Edinburgh Council closing with the deal, the aerodrome is likely to be leased to a civil aviation company. It still, however, leaves the iniquitous "By Grace" robbery position about as bad as bad can be. The continuance of that "By Grace" anachronism makes as much as anything for sympathy toward Socialistic upheaval, not to say Bolshevism, as much as anything existent. But our bureaucratic masters will never learn. They are too blinded by their own interests.

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Newcastle Town Moor aerodrome was last week disposed of by Messrs. R. and W. Mack at auction for £6,000. So runs a local newspaper's report. But it is not clear whether this was for the 'drome itself or for the buildings and other bric-à-brac attached thereto, or both. At least one point emerges from the account. A French steel hut, with "18 steel lattice-built stanchions which tower above the roof and make it a landmark in the neighbourhood," was, after starting at £500, knocked down to Messrs. Ellis and Co., of Newcastle, for £2,100, "including electric fittings." We hope the Newcastle authorities have themselves secured the aerodrome for aeronautical development purposes.

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Economy in R.A.F. matters is under consideration in the direction of abolishing the R.A.F. Chaplains' Branch, it being suggested that such duties can be undertaken by the Royal Army Chaplains' Department. One thing is certain that pilots, in the ordinary routine of their avocation, should be nearer heaven even than their shepherds.

- - -

In the new Department of the Board of Trade created to deal with claims by sufferers from air-raids, matters are getting busy. The City Corporation are inviting victims within the City area to send in their claims without delay, and, no doubt, other municipalities are also alive to looking after the interests, in this connection, of their respective parishioners. Is it the Huns to whom the little bill be presented?

- - -

Strawberries by aeroplane to Paris is the latest luxury stunt from the Var Department, France. The consignment was 45 baskets containing 894 berries, and the price realised in the market was 559 francs for the lot.

- - -

In an Isle of Man paper under the heading "Flying Next Summer," it is stated that "The Promenades Committee (Douglas) have given the Carnival Committee permission to hold a Flying Kilometre Competition on the Promenade on the morning of Wednesday, June 16." Wonder what sort of a stunt it is the Royal Aero Club are sanctioning for our Manx friends. Or is it a case of taxying without taxis, but with cars or motor-bikes up instead.

- - -

Flying Police.—"Yes, your wushup, I was on duty in Section XII, when I saw the prisoner. He was driving his 'plane at a furious pace and flying on the wrong side of a cloud. Held up my hand to stop him, but he took no notice, and after nearly colliding with a nursemaid on her aerial pram, he crashed right into the doorway of the 'Aviators' Rest,' causing the same to rock and nearly break from her guys."

- - -

America has decided to have Flying policemen. For the love of anything, don't drop the "F" from the adjective, Mr. Printer, or the Force will think we've done it on purpose.—*Aero* "*Joystick*."

- - -

Sir Fortescue Flannery, in his newly-found love for the airship, was rather sweeping in his assertion the other day that the aeronautical engineer was indebted to the marine engineer for the internal combustion engine, screw propeller and rudder. As a matter of fact, the rudder was discovered long before the marine engineer, as such, came into the picture; the screw propeller for marine purposes dates from about 1840, whereas Gen. Meusnier used propellers for driving an airship in 1784, and it is hardly too much to say that the marine engineer opposed the introduction of the internal combustion engine for marine propulsion, and accepted it only when it was practically forced upon him.

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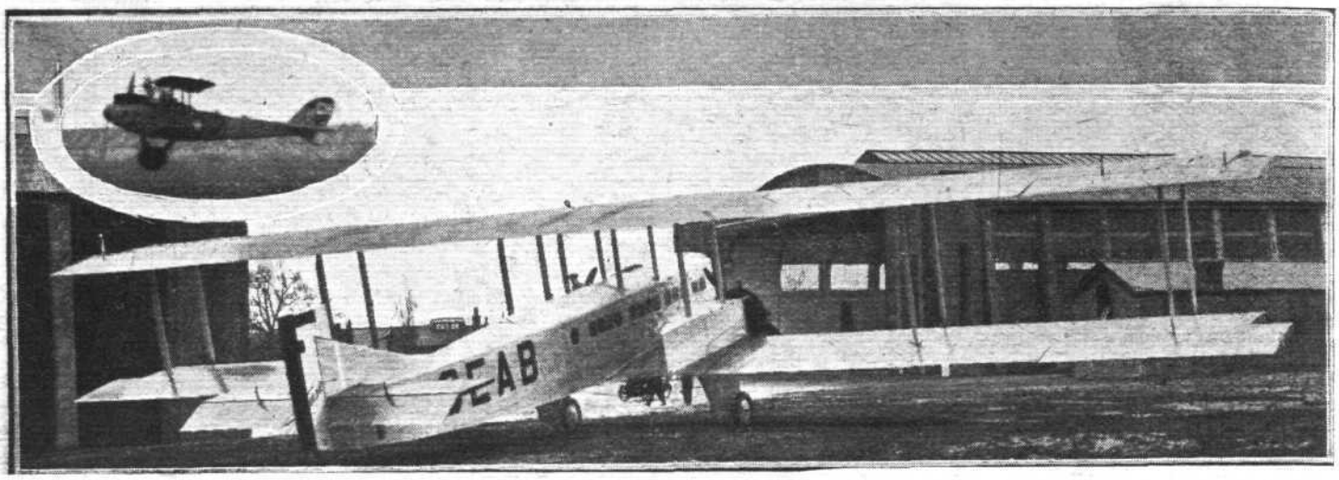
We certainly ought to know how we are—or rather are *not*—going on with British civil aviation. Yet the report just sent over from New York takes quite a different outlook, and it is, in the light of our knowledge of affairs here, almost ludicrous to read this development and see how others profess to see us. We can well believe the British bogey is being worked, regardless of facts, for the bringing up to the mark

THE OPENING OF WADDON AIR PORT: The new Airco 18, 450 h.p. Napier Lion engine, ready to commence work on the London-Paris air service. This machine has a different seating accommodation from previous types, the pilot being placed far back in the *fuselage*, behind the cabin, which seats eight passengers. A three-bladed propeller is fitted.



THE OPENING OF WADDON AIR PORT : After serving as the London Terminus for continental air traffic for several months, Hounslow aerodrome has been relinquished for the use of Cavalry, and the port arrangements have been transferred to Waddon, near Croydon, from which air port traffic was inaugurated on Monday of this week. Our photos. show the Farman Goliath ready for the trip to Paris, and, inset, M. Comte starting off for Switzerland on the machine on which he brought over Robert Loraine recently.

the Congressmen who at present are looking askance at aviation and its future. Therefore, according to the New York cable to hand, the American aeroplane manufacturers are besieging Congress with frantic appeals for protection against British and French competitors, who, they contend, are dumping their products on the market in a manner which threatens their industry with extinction.

Special complaint is made against British competition. British manufacturers are accused not only of advertising machines at very low rates, " which are made doubly attractive because of the cheapness at which the pound sterling can be bought with dollars," but of profiting from opportunities furnished them by the British Government. An Inter-Allied Aircraft Corporation is cited as a particularly grave offender in this respect, it having just purchased from the Government 10,000 areoplanes at from 10 to 30 per cent. of the original cost of manufacture.

The American manufacturers declare that British firms are offering at £700 to £1,000 machines which it would cost them £2,000 to £3,000 to make. What is worse, the British are not only selling surplus War stock, but are continuing to produce new machines at a prodigious rate in what the American manufacturers describe as " a tremendous drive " to control the commercial aeroplane industry of the world.

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THAT's assuredly done it. So now, with these facts before him, it's up to Mr. Holt Thomas to withdraw his resignation and get on with it again.

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IF plain John Smith predicts anything startlingly out of the orthodox, as a rule the world passes by. But when a Mr. Athmanatha Iyer predicts great doings, the public is ever ready to swallow any old story, and never care a jot as to reasonable facts. Therefore comes it about that almost every other man you meet who follows things, you know, keenly, queries one as to that thousand miles an hour aerial propeller. From Madras this wonder-tale has emanated, based upon the claim of the said A. I. that he has invented a prop. which will revolutionise air travel by surpassing all revolutioning props. hitherto in being. It is to give a speed of 1,000 miles an hour in the air, it can be fitted to any existing air-conveyance as fancy suggests, and any fuel can be used—coal, oil or gas. Apparently the inventor thoroughly understands the latter article of furniture, as friend Athmanatha is very careful to let it be known that the invention is being kept a secret, and it will be up to the purchaser to secure his patents after they or he have been—sold and presumably paid for.

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THERE appears to be only one little drawback to this little revolutionary stunt, and that is that its maximum speed is only limited by the engineers' skill to overcome natural difficulties !

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IN case landlubber and seadog transport service folk may get the wind up at the prospect of *their* number being up, it may be reassuring for them to learn that Mr. A.I. has arranged that his power unit is equally applicable to any sort of conveyance on land and water. Nothing like not doing the thing by halves while you are about it.

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THE other day a wonderful display of the Aurora Borealis was witnessed in the early hours of the morning, the illumination being so brilliant that it is alleged the smallest newspaper print could without difficulty be read at Barnet, and that poultry were inveigled into starting their daily avocations of crowing and laying at about one in the morning. This little manifestation recalls to mind that the Huns during the War were alive to the possibilities of this phenomena, and during the later stages of the War under similar conditions made an unexpected air-raid upon England.

Cairo to Cape Flight

THE Air Ministry announces that the following message has been received by the Secretary of State for the Colonies from Lord Buxton, Governor-General of the Union of South Africa :—

" The Union Government Ministers request me to convey to the Air Ministry the Government of the Union of South Africa's warm appreciation of the high enterprise and foresight of His Majesty's Government in laying out the aerial route from Cairo to Cape Town, thus making possible the accomplishment of the wonderful air journey from London to Cape Town by Wing-Comdr. van Ryneveld and Flight-Lieut. Brand, despite all difficulties, dangers and mishaps.

" The Government of the Union of South Africa is deeply indebted to the Royal Air Force for making these two South African officers available and for the invaluable assistance they were given, more particularly at Cairo in placing another aeroplane at their disposal and assembling it for the trans-continental flight.

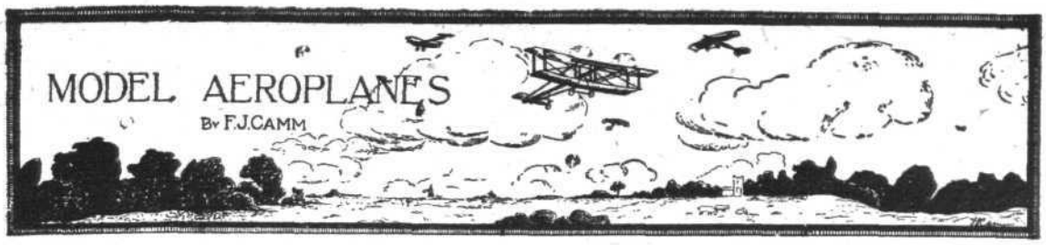
" The Government of the Union of South Africa is especially gratified that the first use to which the Air Ministry's magnificent gift of 100 aeroplanes and equipment was put has been the employment of one of these machines, christened the " Voortrekker " (a D.H.9 with Siddeley Puma engine), to carry through this extraordinary and most noteworthy enterprise. My Ministers are convinced that the knowledge and experience thus gained will be of the greatest practical benefit and the utmost use to the development of long distance air communication over most difficult countries in all altitudes and climates.

" The Government of the Union of South Africa greatly regret that other attempts to complete the journey have not hitherto proved successful and desire to express the greatest admiration of the pluck and enterprise of those who embarked on this very formidable venture.—BUXTON."

Lord Buxton has also sent a cable to *The Times* stating that Capts. Cockerell and Broome have handed to him the letter from His Majesty, entrusted to Dr. Chalmers Mitchell, as well as the letters from Lord Milner and Lord Allenby.

The log of Wing-Comdr. Ryneveld shows that his actual flying time from Brooklands to Cape Town, a distance of 7,500 miles, was 4 days 13 hours 30 mins.

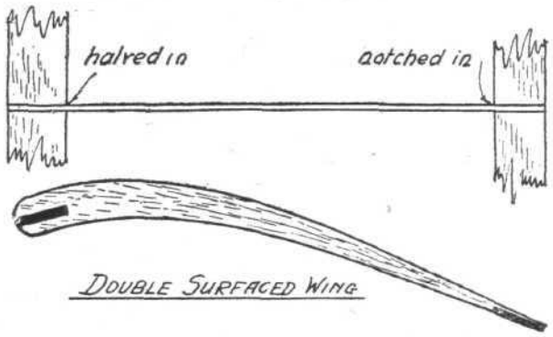
FLIGHT



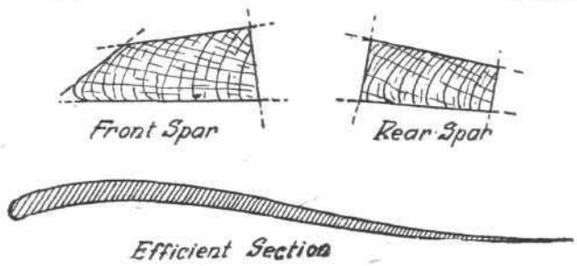
NOTE.—*All communications should be addressed to the Model Editor.*

Wing Construction

The subjoined drawings show a new way of constructing cambered wing framework. It is to cut the ribs to the correct camber, and then to let the spars in, as shown black. The



usual method of bending the ribs to the camber is inefficient, because the bottom camber is thus equal to the top. This method, however, whilst it does not add to the weight, permits of a more efficient construction and also double surfacing.



I also show an efficient wing section for models, and spar sections which lend themselves to the construction of cambered surfaces more readily than do the ordinary rectilinear section.

Easter Model Flying

Will those model clubs holding an Easter meeting please acquaint me with the fact, as I should be glad to visit clubs in London and its environs as far as time permits.

The Groves Compressed Air Plant

Mr. H. H. Groves has forwarded his newly-designed compressed air plant for model aeroplanes recently shown at the British Industries Fair, and in all points I think the plant excellent. That flimsiness so typical of the several plants formerly on the market (with few exceptions) is markedly absent. It is designed on the double-acting principle. with a link motion connecting the crank to the pistons. The cylinders are rigidly made with separate heads, secured against pressure by means of buttress threads. The compression is such that one can scarcely run the engine over by the crankshaft in the reverse direction—yet friction is quite low. The well-known leather cup-washer principle has been embodied in the pistons. We recently inflated the container (substantially yet lightly built), and found that it maintained pressure for over three hours, so low has leakage been reduced. The valve, too, is singularly airtight, and throughout every ounce of pressure is made full use of.

The total weight of the plant is 14 ozs. barely without the air-screw. I found that with an 18-inch screw an effective flight of 60 secs. should be easily obtained, with the glide which would undoubtedly follow. The writer is at present making a tractor machine for the plant, and will announce results in due course. On a bench test a thrust of $5\frac{1}{4}$ ozs. was obtained—a truly remarkable result. Mr. Groves is to be congratulated on having satisfied nearly all of the requirements entailed by such a plant, and to have embodied them in a design which is an engineering job. I shall refer to the plant in greater detail in due course.

Building C.A. Motors

Accuracy in all portions must be aimed at. A $\frac{1}{1000}$th part of an inch in some of the portions will make all the difference to the engine's efficiency; more especially is this so with the valves, which must be an air-tight fit. A small Drummond lathe is quite suitable for turning the various parts. Balance, too, plays a part of some importance in the efficient running of a C.A. motor. In connection with the latter it must be remembered that a piston, for instance, may only be a fraction of a dram heavier or lighter than the remainder, but under revolution a very considerable unbalanced force is set up, resulting in vibration and uneven torque. It is desirable that almost perfect reciprocation be obtained, otherwise the motor may only give 30 per cent. or 40 per cent. efficiency. Some of the commercial motors I have seen show an appalling lack of balance, albeit many of them are of sound design.

There has been a general avoidance of rotary engines, owing to a reputed wastage of power, but provided that the pistons are made a free fit within the cylinder and a suitable means is employed for packing them to ensure air-tightness, they are quite as efficient as the stationary ones I have seen. In the latter respect, the familiar cycle-pump principle has been utilised to attain this end, and has been found to work extremely satisfactorily. The idea of its use is not new. I think the French first introduced it in some of their rotaries. By its use much circumferential friction may be eliminated between piston-surface and cylinder-walls, because the former need not be made an air-tight fit, since the powerful blast of air let into the cylinder-head at high pressure expands it, and so prevents leakage.

Testing C.A. Containers

In order that there shall be no leakage of pressure the container must be inflated to a pressure per square inch higher than it will normally be called upon to withstand, and entirely immersed in paraffin. Many leaks are bound to exist at first, and will reveal themselves by causing a series of bubbles to issue to the surface of the oil. These must be thoroughly stopped up, as the smallest leak will make a difference to the power developed by the motor. Do not use spirits of salts, otherwise within a couple of days the container will be quite useless; Fluxite or powdered resin is much better, as it leaves no deleterious acid residue. The most likely place for leaks to occur is along the seams, or at a place where the thin foil has been cracked or creased. A careful search must be made for them, because the minutest leak becomes enlarged after the container has been inflated two or three times.

Thin sewing-machine oil diluted with paraffin should be used to lubricate such motors. When a plant has been completed the thrust should be weighed on a spring balance, so that a model of suitable weight and area may be designed for it.

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H.P. Paris and Brussels Air Services

ON the Handley Page Continental Air Services between September 2, 1919, and March 20, 1920, inclusive, 1,114 passengers and 58,123 lbs. of freight have been carried over a distance of 81,929 miles.

A Handley Page machine left Paris for London on the 18th inst., with five people and 1,250 lbs. of freight on board. Flying in the face of a strong wind at a height of about 1,000 ft., it reached the coast where it ran into fog with a visibility of only 10 to 14 yards. The pilot, however, flew the Channel, the journey occupying 1 hour 5 mins.

On emerging from the fog after crossing the Channel, the machine ran into fine but very windy weather and safely landed at Cricklewood after a non-stop flight of 5 hours 10 mins. Three other single engine machines left Paris about the same time and were forced to return, being unable to cross the Channel; the Handley Page was the only machine which completed the journey on that day.

SIDEWINDS

HANDLEY PAGE TRANSPORT, LTD., the transport section of the Handley Page organisation has just completed its first winter's operations. Flying has been maintained almost uninterruptedly week by week, although many individual flights had to be postponed owing to inclement weather or lack of machines at the starting point; before the end of the summer, however, arrangements will have been completed that will largely deal with these two causes of delay. The fuller and more reliable weather forecasts now available and the experience gained by the personnel, and the use of Marconi wireless telephony between the machines and aerodromes will do much to counteract the obstructions of weather. A larger number of machines in commission and a better understanding of the handling of them will tend to ensure that a machine in flying condition is always available where it is required.

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ALREADY the bookings of passengers and freight are testifying to the additional traffic that will appear as the summer weather comes on. To cope with the increased demand, Messrs. Handley Page, Ltd., are putting a much larger number of machines into commission. These will all be of the standard "O" type hitherto used, but a departure will be made in the method of fitting them out. Instead of being fitted out as "limousines" comprising a cabin in the rear for six passengers, a cargo hold in the centre, a forward cabin for two passengers and two passenger seats in the nose, the new machines will be arranged definitely either for passengers or for cargo service. In the former case the accommodation will comprise a saloon generally on the principle of the O/7 type but with various improvements that were introduced into the W/8. The machines for cargo will consist almost entirely of a cargo hold, but a small cabin will be provided in the rear for the accommodation of two or three passengers, and there will, as usual, be the two passenger seats in the nose.

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IT is intended to run a daily service of passenger machines to Paris and a service of freighters on alternate days. The Brussels service will be alternately passenger and freight machines daily. The cargo machines flying on the alternate days will be able to carry three passengers in case of need.

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IT is not proposed to alter the fares and freights now charged, namely, 15 guineas for passengers, and 2*s.* 6*d.* per lb. for parcels, either between London-Paris or London-Brussels. It is probable that higher prices would be obtainable from passengers during the more delightful flying weather, but these present rates are remunerative and it has been decided that it is better policy to carry as many passengers as possible at the minimum remunerative rate, rather than to restrict the number and obtain a higher fare from each.

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IT was an engine of the Sunbeam-Coatalen "Matabele" type, developing 425 h.p., which was fitted to the Despujol's motor-boat which, on March 23, attained a speed of 75 m.p.h. on the Seine.

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The Airship Officers' Club

THE annual general meeting is to take place at the Connaught Rooms, Great Queen Street, on Friday, April 23, at 6.30 p.m., and will be followed by the annual dinner. Owing to the reduction of the Airship Service it is felt that it is no longer possible to have club rooms in London. It is therefore proposed that the club should become a dining club and hold one dinner annually and such other functions as may be decided upon. A circular has been sent to members, explaining the proposals and votes must be sent to Maj. G. F. Herron, Hon. Secretary, A.O.C., 147, Oxford Street, W.1, by April 14.

The Airship Old Comrades' Association

THE Secretary of the Airship Old Comrades' Association is now Mr. A. H. Doherty, c/o Anglo-Java Rubber Co., 65, London Road, E.C. 2.

The Flight to Australia

CAPT. MATTHEWS, on his Wallaby-Sopwith, and Lieuts. McIntosh and Parer, flying their D.H.9, continuing their flight to Australia, left Calcutta on March 24 to fly to Akyab (Burma). The D.H.9 aeroplane, however, had to return shortly afterwards owing to engine trouble. Capt. Matthews landed at Rangoon on March 25, having made the journey from Akyab in misty weather.

To Our Readers

As we continually receive complaints from readers that they experience difficulty in obtaining their copy of FLIGHT promptly each week, we draw their attention to the subscription form which is printed on page xxix of the current issue. If this is sent, accompanied by the appropriate remittance, to the publishing offices, 36, Great Queen Street, W.C., it will ensure FLIGHT being received regularly each week upon the day of publication.

Aerial Survey in the Antarctic

IT is felt that Mr. J. L. Cope's proposed lecture on "Aerial Survey in the Antarctic," would prove of enhanced interest if it contained the results of the deliberations of the special Committee of the Royal Aeronautical Society, to be appointed, at the request of the British Imperial Antarctic Expedition, to advise on the plans and details of the proposed use of aeroplanes in connection with the Expedition. At Mr. Cope's request the lecture, which was to have taken place on Wednesday evening, April 7, has therefore been postponed to a date which will be announced later.

Mr. Hughes Flies with Ross Smith

WORD comes from Melbourne that Capt. Sir Ross Smith on March 25 flew from that city to Adelaide in 6¾ hours. On his return to Melbourne, Mr. Hughes accompanied Sir Ross Smith in a flight over the city, after which the famous Vickers-Vimy-Rolls was placed in the War Museum.

Germany's Aeroplanes

WORD comes from Paris that the Inter-Allied Commission have found altogether 12,000 3-in. field guns and 6,000 aeroplanes intact, in various parts of Germany, yet she is only supposed to have a total of 264 guns and no aeroplanes.

The Rome-Tokyo Flight

LIEUTS. FERRARIN AND MASIERO, on two of the S.V.A. machines in the Rome-Tokyo flight, arrived at Calcutta on March 12. They were at Rangoon on March 25. The last squadron of S.V.A's. under Capt. Gordesco reached Adalia on March 26.

Apparently a good deal of adverse criticism has been aroused in Italy, and according to the *Tempo* over 12,000,000 lire (£480,000 at pre-war rates) has been spent. Mistakes in organisation are said to have resulted in the flight being a "partial failure and a total financial disaster."

A New Italian Airship

SUCCESSFUL trials have been made with a new Italian airship of the semi-rigid type. The length of the airship is said to be 125 metres; it has six engines, which give it a speed of 125 km. (78 miles) per hour.

FLIGHT

The Aircraft Engineer and Airships

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